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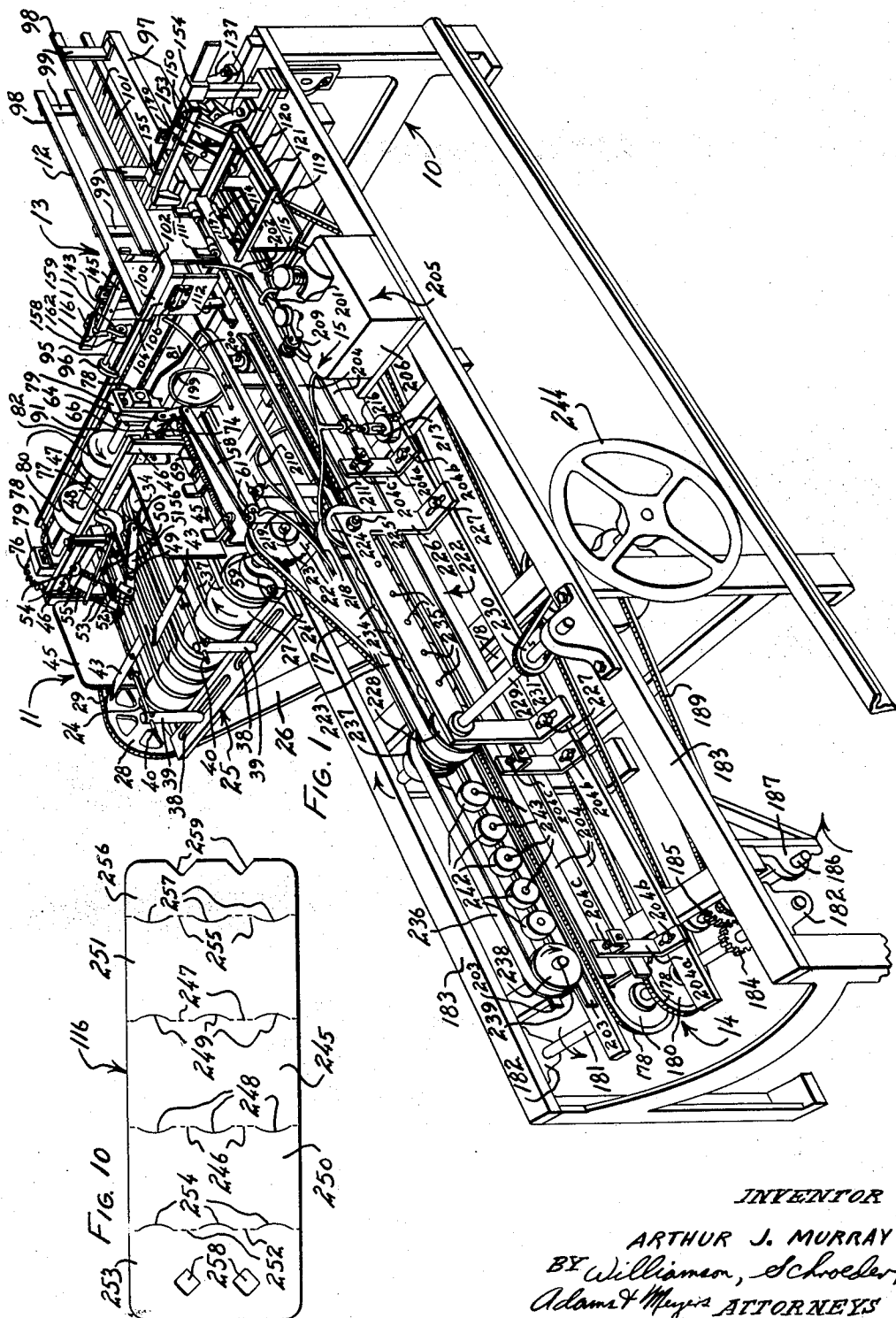
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APPARATUS FOR PACKAGING ARTICLES

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5 Sheets-Sheet 1



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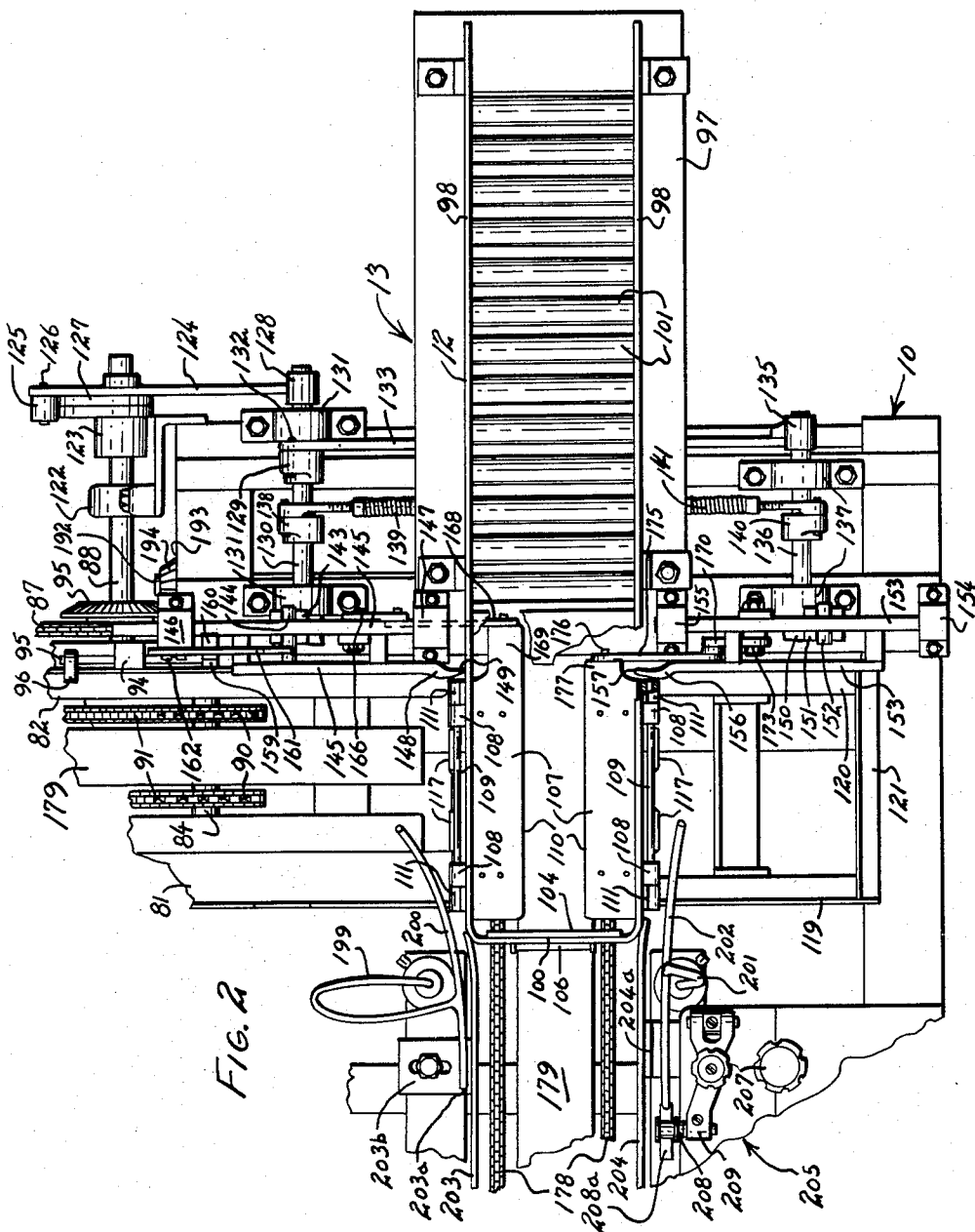


FIG. 2

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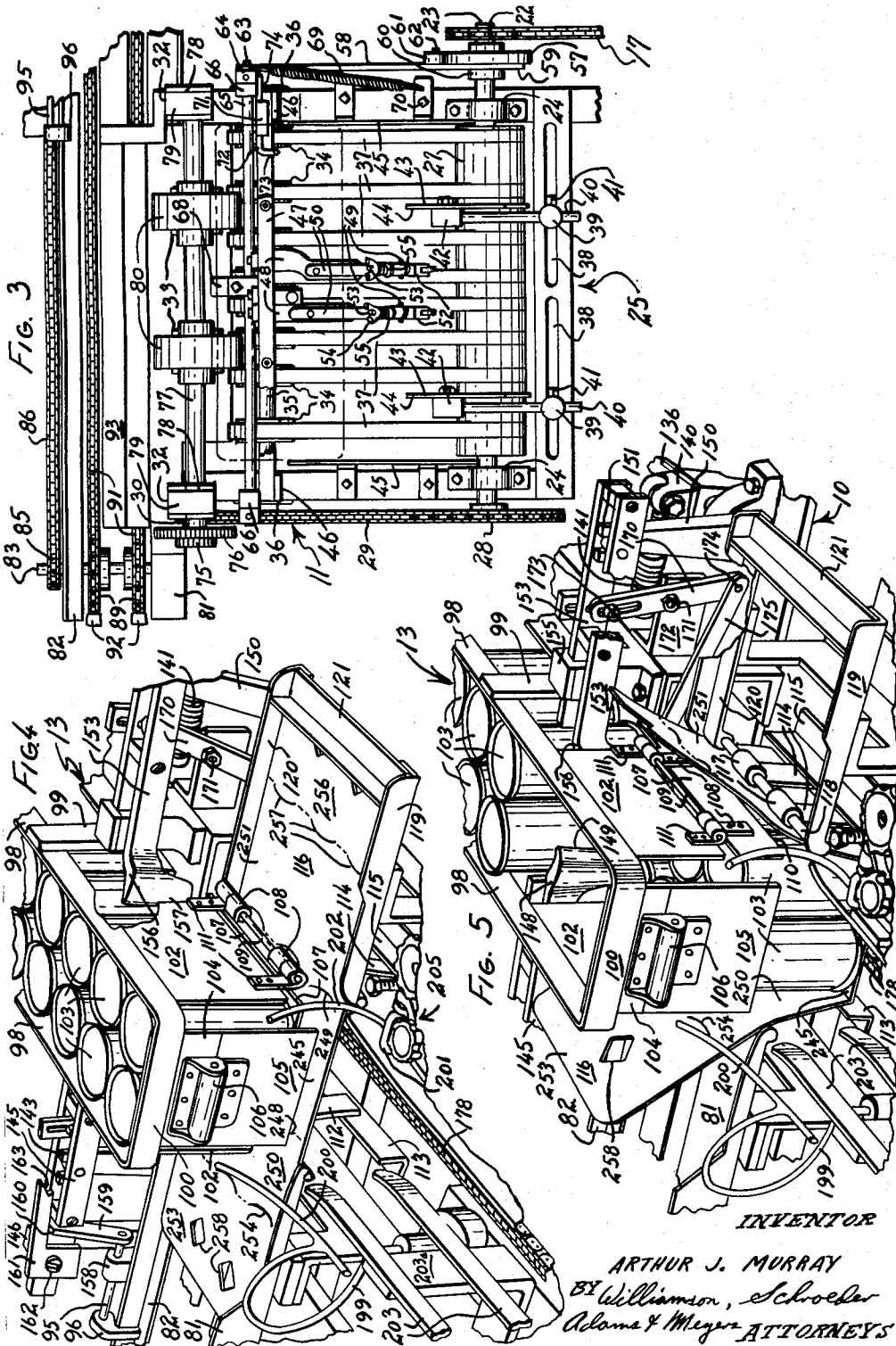
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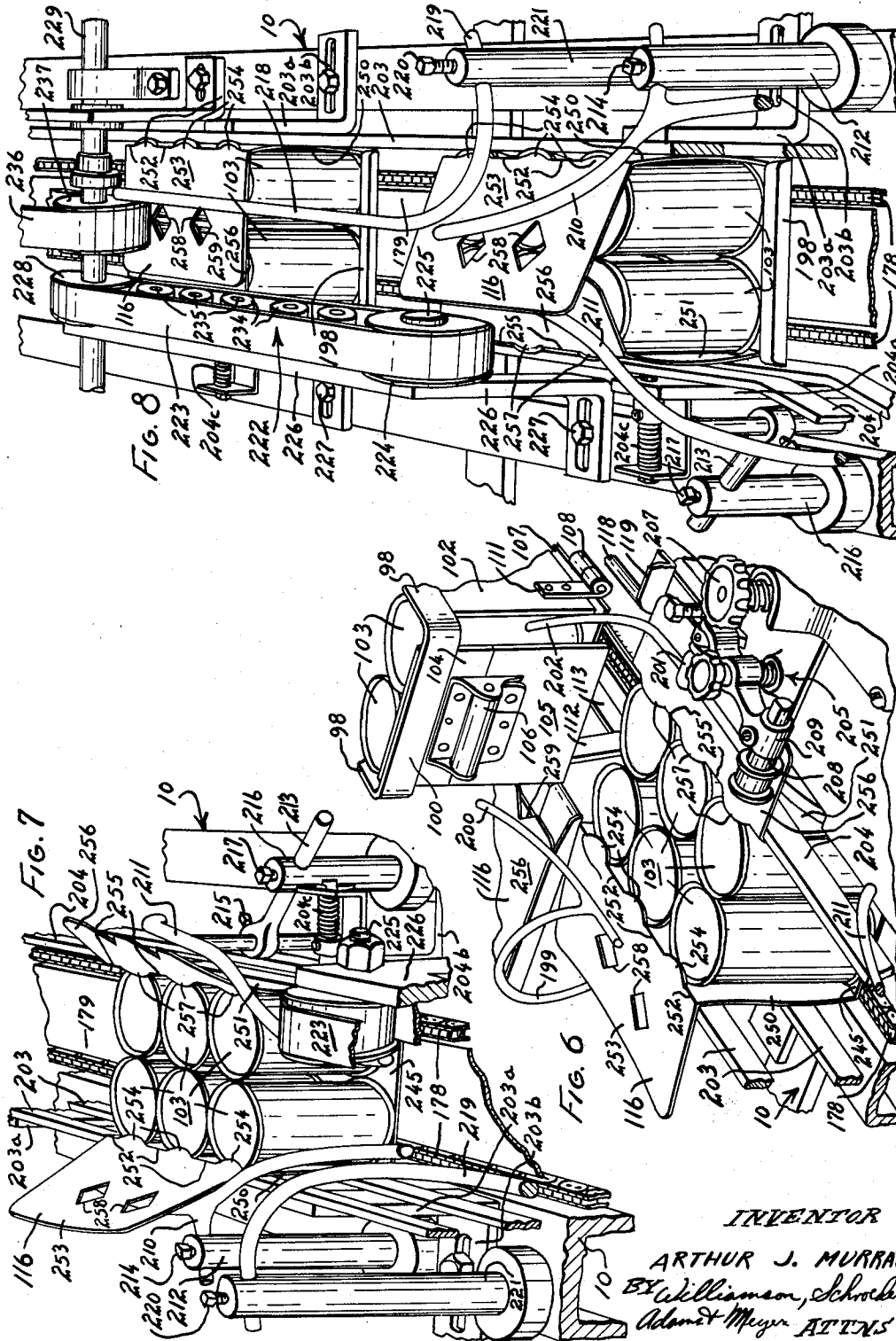
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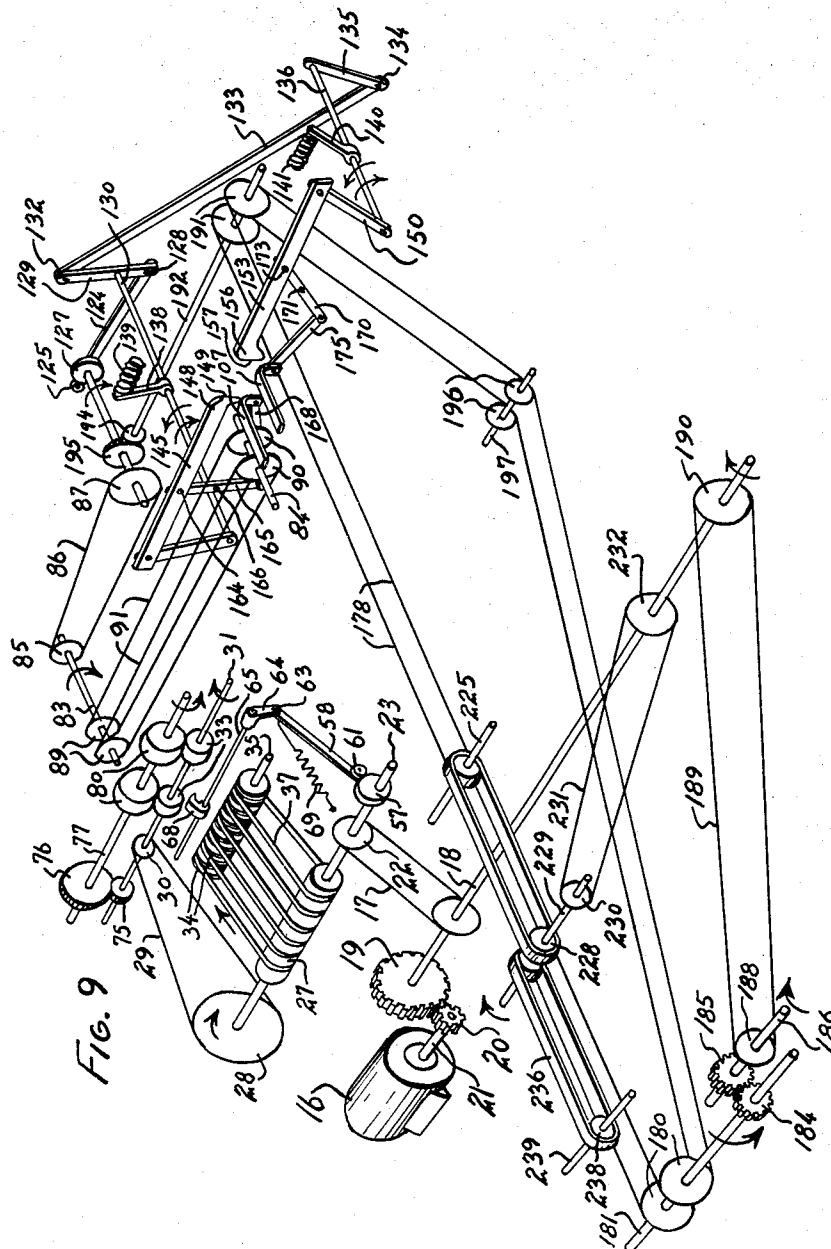
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APPARATUS FOR PACKAGING ARTICLES

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APPARATUS FOR PACKAGING ARTICLES

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2 Claims. (Cl. 53—48)

This invention relates to packaging articles and more particularly to an apparatus and method for packaging one or more rows of articles such as canned goods in a single wrap-around flexible sheet carton blank of the general type disclosed in my Patents Numbers 2,701,661 and 2,701,938, issued on applications co-pending herewith, and in my co-pending application Serial No. 293,872, filed June 16, 1952, now U.S. Patent No. 2,765,073.

The single sheet carton blank disclosed herein and in the above copending application has many obvious advantages such as simplicity, economy and ease of wrapping, but a blank of this type does not produce a wall at the end portions of the carton for directly retaining the articles against endwise displacement. This invention is directed toward the use of such a single sheet carton blank wherein endwise displacement of the cans is prevented.

In the most common of apparatus for cartoning cans such as beer cans, the single flexible sheet carton blank is brought over the top of the cans, which have been previously grouped, and then the carton blank is bent downwardly in closely confining relation with the sides of the cans and tightly pulled by a folding mechanism so as to deform the carton slightly and thereby effect resistance to endwise displacement of the cans from the carton during use. In order to assist in holding the articles, it has been the practice to form openings at the sides of the cartons for bulging the articles thereagainst. In the case of cans having beaded chimes, it has been demonstrated under the teachings of the foregoing copending applications how a mere slit in association with a fold line and without any punch-out in the carton blank, could effectively exert a gripping action on the group of cans thus packaged in a tightly stretched wrap-around type of carton. If, however, the carton is not tightly wrapped or if moisture should permit yielding of the package, the ordinary wrap-around carton will tend to fail under use.

The apparatus developed for previous wrap-around packaging has required that the articles be grouped, the pre-formed carton blank brought over the group of articles and then folding arms are employed to bring the blank down around the sides, the blank then being glued in a strip to retain the articles in tightly bound condition. The packaged carton is then fed out of the apparatus and later inverted to upright position with the articles retained therein. Obviously, the apparatus for turning the cartons and for folding the carton constitutes additional mechanism requiring extra cost for construction and maintenance, which, if curtailed, would render the cost of packaging considerably less.

It is a general object of the present invention to overcome the above difficulties and to produce a novel and more efficient method and apparatus for packaging articles by means of a wrap-around carton blank.

More specifically, it is an object to provide for a method of packaging articles such as canned beer, in which the cans have a beaded chime, which consists in gripping

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against displacement the cans at the chime portion in a single wrap-around operation and without special attention to end flaps or other special positive elements at the ends for holding said articles in place.

It is another object of the invention to provide a method of cartoning chimed cans wherein the cans are ordinarily gripped at both the outside and inside of the chime by the carton blank when it is formed about a group of the cans.

It is a further object of the invention to provide for a method of packaging articles within a prepared carton blank in which at least a portion of the folding operation is accomplished by the released weight and impetus of the articles themselves.

It is another object of the invention to provide apparatus for the rapid and economical cartoning of packages such as canned beer wherein a prepared carton blank is simply advanced to a receiving position where a pre-grouped quantity of packages is quickly applied to the blank and the blank is thereby caused to bend at pre-formed fold lines to closely encompass the quantity of packages.

It is another object of the invention to provide a method for cartoning a group of chimed containers in which a prepared blank has tab elements formed therein and closely associated with fold lines so as to register in engagement with the chimed edge of individual containers, the tab elements being offset by bending of the carton at a fold line to extend inwardly of the chimed edge when the surrounding portions of the blank are to the outside of the chime, the blank then being folded to encompass each container in outer physical contact while wedging and maintaining said tab elements in contact with a chimed edge of each container.

It is a further object of the invention to provide apparatus for effecting the novel wrapping and tab-wedging of chimed containers in which mechanism operates to simultaneously release a group of chimed cans to automatically fold and condition the carton for chime gripping, further mechanism then effecting a firm gripping action at both the inside and outside of the chime by the simple act of folding over the end portions of the carton blank.

A still further object of the invention is to provide a carton package produced from a group of chimed containers held within a wrap-around blank produced from a single elongated sheet of flexible material in which the tension of the blank in its ultimate wrapped position is helpful but not critical in firmly holding the containers against endwise displacement.

These and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

Fig. 1 is a perspective view of my entire apparatus;

Fig. 2 is a plan view of an enlarged fragment of the apparatus, including the packaging mechanism, the gates being in horizontal or elevated position;

Fig. 3 is an enlarged plan view of a fragment of my apparatus, including the carton blank-feeding mechanism;

Fig. 4 is an enlarged fragment in perspective of the packaging mechanism, the gates being in raised position with canned articles disposed thereon and a carton blank projected into operable position;

Fig. 5 is an enlarged fragmental view in perspective similar to Fig. 4, and showing the gates retracted and depressed with the canned articles disposed on the carton blank and the latter bent upwardly adjacent the sides of the canned articles;

Fig. 6 is an enlarged perspective of a fragment of my

apparatus adjacent the packaging mechanism and showing a carton blank with chimed cans disposed therein at the initial end of the folding and securing means;

Fig. 7 is an enlarged fragment in perspective of the folding and securing means at a position more advanced from that shown in Fig. 6;

Fig. 8 is an enlarged fragmentary perspective taken from above and looking downwardly toward the end structure of the folding and securing means and showing the glued carton flaps in the final stages of folding and pressing together in overlapped relation;

Fig. 9 is a diagrammatic view of the drives and linkages apart from the supporting structure in my apparatus; and

Fig. 10 shows a characteristic carton blank adapted to be employed in my apparatus for wrapping chimed cans in a single wrap around.

With continued reference to the drawings, my apparatus comprises generally a supporting frame structure 10 which has a short, L-shaped extension on which is supported a blank carton-feeding mechanism 11, as shown in Fig. 1. Articles to be packaged are brought to the apparatus by means of an article-feeding conveyor 12, the terminus of which overlies and is a part of the packaging mechanism shown generally at 13. In opposed relation with respect to the packaging mechanism is a package conveyor 14 which forms a part of the carton-folding and securing element, shown generally at 15. The entire apparatus is adapted to be operated by means such as an electric motor 16. The function of the apparatus is to automatically feed, from a source of supply, consecutive individual carton blanks and to wrap a plurality of articles such as canned goods and the like in a single wrap-around package and to secure the articles in folded relation within the carton blank so that they will not be easily displaced therefrom, and to automatically seal or close the carton blank in folded relation about the articles, all in a rapid and smoothly continuous manner.

The individual portions of the apparatus, as outlined above, will be considered separately as follows.

Blank carton-feeding mechanism

Referring now to Figs. 1, 2 and 3, the mechanism for feeding blank cartons is shown generally at 11. A flexible belt or chain drive 17 interconnects with a jack shaft 18 which, in turn, has secured thereto a gear 19, intermeshing with gear 20 which is axially secured to shaft 21 which, in turn, is directly driven by the motor 16, the latter drives and elements being set forth diagrammatically in Fig. 9. The chain drive 17 operates sprocket 22 which is, in turn, affixed to shaft 23, as shown in Fig. 1. Shaft 23 is journaled in a pair of spaced bearings 24 which, in turn, are affixed to the L-shaped supporting structure 25, forming a part of the supporting frame 10. One or more brackets or angulated braces 26 may be utilized to maintain the supporting structure 25 for the feeding mechanism in rigid interconnection with the general framework 10. Disposed on shaft 23 are a series of belt-engaging members such as the circumferentially grooved cylinder 27, each in spaced relation with the other and disposed along a substantial portion of the length of shaft 23. The outer end of shaft 23 extends beyond the outer bearing 24 and has secured therewith a drive wheel 28. The drive wheel 28 drives, in turn, through flexible belt or chain 29, a sprocket wheel 30 which, in turn, is mounted on a shaft 31 journaled in bearings 32 in spaced relation at each side of the supporting structure 25, as shown in Fig. 3. The shaft 31 has a plurality of spaced roller elements 33 secured thereto which are adapted to rotate together with the shafts 31 and 23. A journaled series of sheaves 34 are secured to shaft 35 which, in turn, is journaled across the supporting frame 25 in a pair of spaced bearings 36, as shown in Fig. 3. The sheaves 34 are aligned

with the circumferential grooves of cylinder 27 and have secured thereacross respective flexible belts 37, as shown in Fig. 3. These belts all lie in the same plane and constitute a feeder belt for the cartons, as will be subsequently described.

Along the leading edge of the supporting structure 25 are formed a pair of elongated slots 38 which are preferably in alignment, as shown in Fig. 3. Each of the slots 38 is adapted to receive in upstanding relation a standard 39 which can be adjustably positioned anywhere along the length of its elongated slot 38 by such suitable means as a tightener (not shown). Each of the standards is, in turn, provided with an adjustment arm 40 which extends laterally inward and is received in an opening which has a friction member such as set screw 41 in alignment with the arm 40 so as to adjustably position the arm in its horizontal inward extension. The inner ends of each of the arms 40 are pivotally connected at 42 to an angulated support 43. Each of the angulated supports 43 is, in turn, pivotally mounted at 44 to the supporting frame 25 so that the inclination of the angulated supports 43 may be varied as desired by the operator.

A pair of spaced sideboards 45 are also mounted in upstanding spaced relation at each side of the supporting structure 25, as shown in Fig. 3. At a more advanced position from the sideboards are mounted a pair of standards 46, the upper ends of which are secured to a mounting bar 47 which overlies in spaced clearance the surface of the flexible belt members 37. Mounting bar 47, in turn, has secured thereto a pair of rearwardly formed brackets 48, each of which has a pivotal terminus 49, as shown in Figs. 1 and 3. The brackets 48 also have angulated rigid arms 50 which extend rearwardly and upwardly from the pivot ends 49, as shown in Fig. 1. Rocker arms 51 are pivotally mounted to the pivot ends 49 of brackets 48 intermediate their ends, and each of the rocker arms 51 are also pivotally connected at their rearwardly extending ends 52 to adjustment rods 53 respectively connected thereto, as shown in Fig. 1. The adjustment rods 53, in turn, are slidably received by the rigid arms 50 and are provided at their upper ends with threaded wing nuts 54. Compression springs 55 are interposed between the wing nuts 54 and the arms 50 so as to maintain constant pulling force on the pivotal outer extensions 52 and thereby cause the arms 51 to bear downwardly at their forward and downward ends. A roller member 56 is journaled at the lower forward end of each of the arms 51 and such roller is adapted to overlie and press against carton blanks as will be presently described.

The shaft 23, to which the cylindrical roller 27 is attached, also bears a cam wheel 57, as shown in Fig. 3. An actuating arm 58 has a forked end 59 received over the hub 60 of cam wheel 57 and the actuating arm 58 also has a cam follower 61 mounted on an upstanding stub shaft 62 rigidly attached to the arm 58 at a point inwardly from the forked end 59. Cam follower 61 is adapted to roll upon and be guided by the cammed circumference of cam wheel 57, as shown in Fig. 3. The opposite end of actuating arm 58 from the forked end 59 is pivotally secured at 63 to a crank arm 64, as shown in Figs. 1 and 3. Crank arm 64, in turn, is rigidly attached to a shaft 65 which is journaled in bearings 66 disposed in spaced relation one at each side of supporting structure 25, as shown in Fig. 3. At a medial position on shaft 65 is secured a latch finger 67 having a forwardly and downwardly disposed abutment 68 for engaging the leading edge of a carton blank fed therein. A tension spring 69 is interposed between the forward end of actuating rod 58 and a bracket 70 fastened, in turn, to the supporting structure 25. A sleeve 71 is secured in horizontal position on the mounting bar 47 and slidably receives a stop bar 72 which terminates in a bent hand lever 73, as shown in Fig. 3. The outward extension 74 of the stop bar 72

is adapted to be moved into abutting relation with the crank arm 64 so as to prevent cam follower 61 from maintaining continuous contact with cam wheel 57 when it is desired to stop the feeding of carton blanks, all as will be described subsequently under the operation of the apparatus.

Shaft 31, which bears the roller 33, also has a gear 75 secured concentrically thereto. The gear 75, in turn, is adapted to intermesh with a larger gear 76 which, in turn, is concentrically secured to shaft 77. The shaft 77 is journaled in a pair of spaced bearing blocks 78, as shown in Fig. 1, and each of the bearing blocks 78 are, in turn, slidably and resiliently mounted in downwardly urged fashion in respective slide mounts 79 which are, in turn, secured to the supporting structure 25. Supported on shaft 77 are a pair of resilient faced rollers 80, each of which overlies a smaller roller 33, previously described. The rollers 80 and 33 rotate in opposite direction so as to pull a carton blank through when the finger 67 and its associated abutment 68 is withdrawn from holding relation with the edge of a carton blank. It will be further observed that the rollers 80 and 33 operate at a higher peripheral speed than the belts 37 so as to rapidly pull the carton blank through the mechanism and create a space between the carton blank being removed and the next succeeding blank, as will be set forth under operation of the machine.

Also forming a part of the supporting structure 25 in the blank carton-feeding mechanism is a pair of laterally positioned carton supports 81 and 82, as shown in Figs. 2 and 3. Mounted underneath and journaled across the respective ends of the carton supports are shafts 83 and 84, as shown in Figs. 2 and 3. Shaft 83 has a sprocket 85 mounted thereon and is driven by roller chain 86 which, in turn, is connected with a sprocket 87 in turn driven by shaft 88 journaled independently across the opposite ends of the carton support members 81 and 82. The shaft 83 also has mounted thereon a pair of sprockets 89 in spaced relation between the carton support members 81 and 82 and lying in the same plane therewith or slightly below. A similar set of idler sprockets 90 are mounted on shaft 84, as shown diagrammatically in Fig. 9 and in Fig. 2. The two pairs of sprockets 89 and 90 are in alignment and are interconnected by a pair of roller chains 91, as shown in Fig. 3. The roller chains 91 have correspondingly positioned lugs 92 which extend upwardly above the plane defined by the carton-supporting members 81 and 82. A hold-down sheet 93 is secured to the supporting structure 25 in spaced relation just above the plane of the carton-supporting members 81 and 82 and in clearance with lugs 92 so as to maintain a carton blank for delivery and in position to be engaged by the lugs 92. An upstanding mount 94 is secured to the supporting structure 25 and has rotatably received therethrough a rod 95 in horizontal position, one end of the rod bearing a feeler 96 which extends inwardly and downwardly to intersect the projected pathway of a carton blank, as shown in Figs. 2 and 3. The carton blank, when in pressing engagement with the feeler 96, will permit other mechanism to operate as will be subsequently described, but in the event there are no carton blanks in the feeder mechanism or if the operation of the feeder should become impaired, then certain other portions of the machine will not permit canned articles to be fed into the packaging mechanism.

Packaging mechanism

The packaging mechanism controls the grouping of the articles to be wrapped and also receives the carton blank which is applied to the articles in the manner to be set forth. The packaging mechanism 13 includes the article-feeding conveyor 12, as shown in Fig. 1. The conveyor 12 has a rigid frame extension 97 attached to the upper portion of frame 10 and has guide rails or bars 98. The rails 98 are mounted on upstanding posts 99 in spaced relation on the frame extension 97 so as to form an open-

ended chute terminating in a cross brace 100 overlying the resting position of each carton blank fed through the machine. The conveyor 12 has also a series of low friction roller elements 101 mounted across the frame extension 97 so as to permit articles such as chimed cans to be fed by gravity in endwise contiguous relation over the rollers and toward the packaging mechanism. Secured in depending relation at each side of the bars or rails 98 are rigid side members 102 which form vertical and spaced parallel members for closely retaining a group of articles such as chimed cans 103 which are fed in the article-feeding conveyor along rollers 101, as shown in Fig. 4. An end piece 104 is attached to the member 100 and has hinged secured thereto a plate 105 so that the hinge mount 106 will constantly urge the plate 105 toward the articles 103 and into vertical position with respect to the end piece 104. The rails 98, vertical sides 102 and the end 104, 105, constitutes a crib for grouping and holding the chimed cans 103 in a predetermined formation, in the instant case, six chimed cans being disposed in contiguous relation forming two short rows of three each in symmetrical relation.

The bottom of the crib structure is provided with gates 108, one each mounted on a hinge structure to respective side walls 102 and swingable inwardly and upwardly to underlie a short row of chimed cans. The hinge structure is accomplished through a pair of brackets 108 which are secured to each gate at the upper edge and across which is secured a rod 109 in spaced parallel relation with respect to the elongated edges 110 of the gates 107. Each of the gates has its respective rod 109 journaled pivotally in corresponding bracket members 111 which are secured in spaced pairs to each of the sides 102. The hinge structure is such as to lie entirely outside of the crib structure so as not to present abutments which will interfere with the sliding and downward movement of the cans 103 when they are released by outwardly swinging the gates 108 from the position of Fig. 4 to the position shown in Fig. 5. The lowermost portion of the crib structure defined by the sides 102 and end 105 overlies the plane defined by the carton-supporting members 81 and 82.

The end of the carton-supporting members 81 and 82 have secured therewith or formed thereon a rigid, downwardly disposed abutment means 112, as shown in Fig. 4. The ends of the carton support members 81 and 82 may be merely curved downwardly and affixed to a bracket 113 which, in turn, forms a part of the supporting structure 10. The abutment means 112 is closely aligned with the vertical plane defined by the nearest side plate 102 in the crib structure and will retain cans 103 in substantially the same grouped relation as they were in relation to the associated side plate 102. Similarly, independent spaced abutment means 114 is secured to a cross bracket 115 affixed to the frame 10 in spaced relation with the abutment means 112. Here again, the abutment means 114 is closely aligned with the plane defined by the associated side plate 102 but underlying the crib structure so as to provide spaced clearance and an unobstructed passageway underneath the crib walls 102 and 105, as shown in Fig. 4. In order to assist the bending and relative shifting movement of a carton blank 116, the upper ends of the abutment means 112 and 114 are smoothly rounded at 117 and are secured to a horizontal rod structure 118 which interconnects across the carton-supporting members 81 and 82 and similarly interconnects across carton-supporting members 119 and 120, as shown in Fig. 5. The members 119 and 120 are, in reality, spaced continuations of the carton supports 81 and 82 so that a carton blank shifted therealong will be picked up at its forward end and retained in alignment with the crib structure and with the preceding carton support structure, as shown in Fig. 4. The carton supports 119 and 120 are provided in part with horizontal and vertical longitudinal portions which will closely inter-

fit with a carton blank 116 so that the edges thereof will be guided and held in position. The outermost ends of the supports 119 and 120 are interconnected by a rigid cross brace 121 which also forms an abutment to limit the outermost travel of carton blank 116 and to maintain the blank in proper relation position with respect to the crib structure and the articles 103 contained herein.

In order that articles 103, which have not, as yet, been advanced to the crib end of the conveyor, will be momentarily retained while the preceding group are transferred to a carton 116, there is provided retaining members in timed operation with the swinging of gates 108 so that cans 103 will not be accidentally pushed on top of the preceding group as the latter is being wrapped in the carton 116. The retaining means is shown in detail in Figs. 4 and 5 and further clarification may be had by reference to Figs. 1, 2 and 9.

Shaft 88, extending laterally beneath the carton-supporting members 81 and 82, extends outwardly through a bearing member 122 and has a cam wheel 123 secured therewith. A cam rod 124 is slidably mounted in overlapping relation with the forward side of cam wheel 123 and has a laterally extending cam roller 125 journaled on a stub shaft 126 and in rolling engagement with cam surface 127. The other end of cam rod 124 is pivotally connected at 128 to the lever arm 129 which, in turn, is secured intermediate its ends to the shaft 130, as shown in Figs. 2 and 9. The shaft 130 is rockably journaled in spaced bearings 131 which operate the retaining means as will be presently described. The upper end of the lever arm 129 is pivotally connected at 132 with a connecting rod 133, as shown in Fig. 9. This connecting rod extends beneath the conveyor 12 and is pivotally secured at 134 to the lower end of a lever arm 135 which, in turn, is secured at its upper end to the shaft 136. The shaft 136 is journaled in spaced bearings 137, as shown in Fig. 2. Intermediate the bearings 131 on shaft 130 is mounted a rigid upstanding lever 138, the upper end of which bears compressibly against a spring 139 at its outer end and the inner end of which is anchored against the conveyor frame extension 97. A similar lever arm 140 is secured in upstanding relation to the shaft 136 and has its upper end in compressive bearing engagement with spring 141 which, in turn, also bears against the frame extension 97 at the opposite side, as shown in Fig. 2.

The inner ends of the shafts 130 and 136 operate both the gates 107 and the retaining means, as will be described. The shaft 130 is secured at its inner end to the crank arm 142 which extends upwardly and terminates in a forked end 143 which engages a pin 144. The pin 144 is formed through the retaining bar 145, as shown in Figs. 2 and 4. The retaining bar 145 is slidably mounted in an outer journal 146 and an inner journal 147, as shown in Figs. 2 and 4. One end of the retaining bar 145 extends through the bearing 147 and has an enlarged head 148 terminating in a vertical sharp edge 149 which is adapted to intercept one row of cans 103 in their advancing progress along the feed conveyor 12, as shown in Fig. 5. Operating concurrently with the retaining means just described is another similarly constructed mechanism adapted to intercept the other row of continuously disposed cans 103. The shaft 136 also has a lever arm 150 secured thereto and terminating upwardly in a forked end 151, as shown in Figs. 2 and 5. The forked end 151 slidably receives a cross pin 152 which, in turn, is attached to the retaining bar 153. The retaining bar 153 is slidably mounted in the journals 154 and 155 respectively at the outer and inner portions relative to the conveyor 12. The retaining rod 153 passes through the journal 155 and terminates in an enlarged head 156 having a sharp vertical edge 157, as shown in Fig. 9. Because of the connecting rod 133, the heads 148 and 156 operate simultaneously to intercept the respective con-

tinuous rows of cans 103 and to release them simultaneously as well.

It will be noted that the compression springs 139 and 141 operate to continuously urge the retaining bars 145 and 153 to divergent position. Thus, the heads 156 and 148 will be forced convergently when the high position of cam surface 127 is in engagement with the cam roller 125. The retaining rods may be held in can-retaining position against the compression of springs 139 and 141, irrespective of the rotation of cam wheel 123. Thus, at certain times, it is desired to provide a safety mechanism to positively hold back the further advancing of cans 103 without shutting down the operation of the entire machine. More specifically, if, through failure of the carton blank-feeding mechanism, or if a supply of carton blanks has not been replenished, a blank has not advanced to can-receiving position, as shown in Fig. 4, then the machine may become jammed if consecutive batches of cans are permitted to be dropped from the crib structure. In order to prevent such occurrence, the feeling finger 96 previously described is adapted to engage a side edge of the carton blank 116 as it is advanced from the carton-feeding mechanism. The rod 95 on which the feeling finger is mounted is journaled in bearing 158 and extends to the opposite side thereof to terminate in a laterally extending cam lever 159. The outer cam surface 160 of cam lever 159 is adapted to engage the underside of L-shaped latch 161 which, in turn, is pivoted at 162 to an upstanding portion of frame 10. The forward extending portion of L-shaped latch 161 terminates in a notch 163 which overlies the projected path of the outer end of the retaining rod 145, as shown in Fig. 4, and the operation of which will be described later in this specification.

The retaining bars 145 and 153 are also provided with gate-operating means as follows. A pivot pin 164 secures bar 145 to the upper slotted end of a lever 165 which, in turn, is pivotally mounted at 166 to bracket 167, in turn, affixed to frame 10. The lower end of the lever arm 165 is pivotally secured to a connecting rod 168, as shown in Fig. 9. The connecting rod 168 is pivotally attached to a bent bracket 169 formed at one end of the gate 107 lying at uppermost position, as viewed in Fig. 2. At the opposite side of the crib structure, a similar lever arm 170 is pivotally mounted at 171 intermediate the ends of the arm to the bracket 172 which, in turn, is secured to frame 10, as shown in Fig. 5. The upper end of lever arm 170 has a slotted interconnection with pivot pin 173 which is, in turn, secured across the retaining bar 153, as shown in Figs. 5 and 9. The lower end of lever arm 170 is pivotally secured at 174 to the connecting rod 175 which, in turn, is pivotally secured at 176 to a downwardly bent bracket 177 formed on the lower gate 107, as viewed in Fig. 2.

Folding and securing mechanism

Referring now to Figs. 1, 6, 7, 8 and 9, the carton blank 116, together with a group of cans 103, is disposed on the roller chains 178 which lie in guided relation on respective sides of bar 179 which is horizontally disposed on the framework 10, as shown in Figs. 1 and 8. The package conveyor 14 further constitutes a pair of sprocket wheels 180 which are secured to shaft 181 in spaced relation and carry and drive the conveyor chains 178 in their properly spaced relation, as shown in Fig. 1. The shaft 181 is journaled in bearings 182 which, in turn, are secured to longitudinal frame members 183 which, in turn, are carried by the supporting frame 10 and form a part thereof. A gear 184 is axially secured to the shaft 181 and intermeshes with gear 185 which, in turn, is secured to shaft 186 and journaled at 187 in parallel relation on the frame 10 with respect to shaft 181. The shaft 186 in turn has a sprocket 188 which is drivably connected through roller chain 189 with another sprocket 190. The sprocket 190 is axially secured to the jack

shaft 18 which is interconnected through gears 19 and 20 with motor 16, as previously described. The package conveyor chains 178 are disposed in parallel spaced relation horizontally for the length of the machine and lie in driving contact with another pair of sprockets 191 which are mounted in the same spaced relation as chains 178 and are axially secured to shaft 192. Shaft 192 is journaled in frame 10 at 193 and has a beveled gear 194 secured at its inner end, as shown in Figs. 2 and 9. Beveled gear 194, in turn, intermeshes with the beveled gear 195 which is mounted on the same shaft 88 which was previously described as bearing the cam wheel 123. The shaft 88 also is drivably connected with sprocket 87 which was previously described as driving the sprocket 85 through chain 86. The package conveyor chains 178 also ride on a pair of tightening sprockets 196 which are secured axially to an adjustable shaft 197, as diagrammatically set forth in Fig. 9. The package conveyor chains 178 are provided with cross lugs 198 as shown in Fig. 8, which are adapted to engage the carton with cans disposed therein and advance each package to the left, as shown in Fig. 1. Immediately upon being engaged by a cross lug 198, the package has the appearance shown in Fig. 6. A folding bar 199 has a bent contacting rod 200 which engages one end of the carton blank 116, as will be subsequently described. The folding bar 199, is, of course, secured in fixed relation to the frame 10 at one side of the package conveyor, as shown in Fig. 5. At the other side of the conveyor, is a folding bar 201 which likewise has a contacting bar 202 which is adapted to engage the other end of carton blank 116, as shown in Fig. 6. Rails 203 are disposed in vertical relation beneath contacting rod 200 and rails 204 are similarly disposed underneath the contacting bar 202. The uppermost of each of the rails 203 and 204 are mounted on upstanding brackets 203a and 204a, respectively, as shown in Fig. 1. The brackets 204a are adjustably mounted at 203b and 204b respectively. Resilient mounting of the upper rail 204 is accomplished by means of a rod and spring mount at the upper mount 204c at the upper end of the bracket 204a.

A glue spreading mechanism is shown generally at 205 and may constitute any conventional means for applying a glue line to a flap of carton 116, as will be described. Essentially, the glue spreading mechanism 205 has a glue container 206, as shown in Fig. 1, and is provided with adjusting means 207 for varying the position and pressure of the gluing mechanism through pressure roller 208 which, in turn, is journaled in a bracketed bearing 209 at the upper side of the gluing mechanism 205. Pressure roller 208 is adapted to press the flap of carton 116 against gluing wheel 208a. Beyond the gluing mechanism and first folding bars are a set of second folding bars 210 and 211 mounted respectively on standards 212 and 213 through set screws 214 and 215, respectively, the standards being rigidly secured to frame 10, as shown in Fig. 7. The standard 213 may have further adjustability by a horizontal mounting with the vertical standard 216 which has set screw 217 threadably engageable with standard 213. The folding bars 210 and 211 are adapted to overlap the carton flaps, as will be subsequently described. Beyond the folding bars 210 and 211 is a hold-down bar 218, as shown in Fig. 8. This bar is held through a curved end 219 by a set screw 220 threadably received in a standard 221 secured to frame 10 at the same side as folding bar 210. A roller belt hold-down mechanism is shown generally at 222 and comprises a flat, flexible endless belt 223 mounted on a pulley 224 which, in turn, is rotatably mounted on a stub shaft 225 held by bracket 226 and adjustably secured at 227 to frame 10. The second pulley 228 is mounted on shaft 229 which, in turn, has a sprocket 230 axially attached and drivably connected through roller chain 231 with sprocket 232 secured at a convenient position on jack shaft 18. The roller belt 223 is held

down for its length by a series of smaller rollers 234 which are respectively and rotatably mounted on a series of stub shafts 235, each of which extends inwardly from the bracket mount 226. Belt 223 is adapted to lie to the left side over the package conveyor.

Another hold-down belt 236 is mounted on a pulley wheel 237 which is secured to the shaft 229, as shown in Fig. 8, and at the other end thereof is secured to the pulley wheel 238, as shown in Fig. 1. As before, the pulley wheel 238 is mounted on a stub shaft 239 which, in turn, is attached to a mounting plate 240, as shown in Fig. 8. The mounting plate 240 is adjustably secured at 241 to the frame 10. Again, a plurality of small wheel elements 242 are employed to maintain the belt 236 in continuous contact with the top of a package as it progresses beneath the belt under the influence of the package conveyor. Each of the small wheels 242 are rotatably mounted on spaced stub shafts 243 which, in turn, are secured to the mounting plate 240 disposed at the right hand side of the package conveyor in the direction of travel. Belt 236 is disposed medially with respect to the chain conveyor and terminates at pulley 238 slightly short of the terminal end of the package conveyor 14. In order to maintain smooth operation of the hold-down belts as well as the rest of the entire machine, a fly wheel 244 may be secured to the jack shaft 18, as shown in Fig. 1.

The carton blank 116 which is utilized in the present machine is shown in characteristic form in Fig. 10. As previously pointed out, the apparatus contemplates the use of a carton blank of full length and effects the packaging operation by a single wrap-around action. The carton blank 116 is, therefore, constructed of such material as cardboard having a medial area 245 bounded by discontinuous fold lines 246 and 247, slit lines 248 and 249, respectively, being interposed across the discontinuous portions of the fold lines 246 and 247. The adjoining areas adapted to contact the side of articles such as the cans 103, are shown respectively at 250 and 251. A discontinuous fold line 252 separates side 250 from the end flap 253 and slit lines 254 are interposed at the discontinuous portions of fold line 252 in a manner similar to that previously described. In the same manner, a discontinuous fold line 255 separates the side area 251 from the end flap 256 opposed to the end flap 253, and slit lines 257 are interposed across the discontinuous portions of fold line 255 in the same manner as previously described. Openings 258 may be formed in end flap 253 and notches 259 may be formed in end flap 256 in such a manner as to provide finger grips when the carton is wrapped around the cans.

The carton blank 116 and the particular form of the folds and slit portions, as well as the function and purpose thereof, is described fully in co-pending application, Serial No. 458,066, filed September 24, 1954, and entitled "Carrier Package and Method of Packaging," and other portions of the carton blank and the functions thereof are set forth in co-pending applications, Serial No. 259,156, filed November 30, 1951, allowed October 13, 1954, now U.S. Patent No. 2,701,938, and entitled "Method and Apparatus for Packaging Cans and Bottles in Carrier Cartons"; Serial No. 259,155, filed November 30, 1951, now U.S. Patent No. 2,701,661, and entitled "Carrier for Canned or Bottled Goods"; and Serial No. 293,872, filed June 16, 1953, now U.S. Patent No. 2,765,073, entitled "Portable Carton for Canned Goods."

Operation

In the use and operation and in the practice of the method herein disclosed, the carton blanks such as illustrated in Fig. 10 are stacked transversely of the carton feeder 11 so that the foremost side edges of the cartons contact the rocker arms 51 and the rear side edges contact the angulated supports 43 while being supported on the flexible belts 37. Since the belts 37 are continuously

traveling in the direction of the arrow in Fig. 1, the bottom carton will be frictionally urged forwardly at all times. This bottom carton will, therefore, proceed under the rollers at the ends of the rocker arms 51 and will, therefore, be caught between the lower resilient rollers 33 and the larger upper rollers 80 so as to bring the bottom carton into contact with the latch finger abutment 68. Until the latch abutment is raised, no further feeding of cartons will take place. Upon rotation of the cam 57, the cam roller 61 will cause the latch finger to raise once in each cycle of operations so as to release this lowermost carton and permit it to shoot forwardly onto the carton supports 81 and 82.

As the carton blank comes to rest on the carton supports 81 and 82, the forwardmost edge thereof will engage the feeling finger 96 so as to cause shaft 95 to swing through an arc and raise the latch 161 by virtue of the cam surface 160 on lever arm 159. With the latch 161 in raised position, the retaining bars 145 and 153 will be permitted to retract and thereby release a quantity of cans 103 into confined relation within the crib structure.

As roller chain belt 91 advances laterally to the carton feeder, lugs 92 will contact the outermost end of carton blank 116 and cause it to advance to the right, as shown in Fig. 1, ultimately assuming the position shown in Fig. 4. As the machine cycle progresses, cam 127 rotates to its high point so as to cause the retaining bars 145 and 153 to move convergently and thereby retain all of the articles 103 rearwardly of the crib structure. At the same time, the gates 107 will be caused to swing downwardly under the influence of the lever arm linkages 168 and 175 and are interconnected with and operate concurrently with the converging and diverging movement of the retaining rods. As the gates 107 swing downwardly, the plurality of cans retained in the packaging mechanism will be permitted to drop by gravity through a short distance and strike the medial area 245 of the carton blank 116. As the articles and the carton blank are thrust downwardly to contact the package conveyor chain 178, the fold lines 246 and 247 are caused to break by virtue of the curved abutments 112 and 114 at each side of the package respectively. In the present instance, it is contemplated that the articles 103 shall constitute canned goods wherein the container cans are circular and are provided with conventional chimed ends. The lower chimed ends of the cans 103 will, therefore, rest against the curved slits 248 and 249 and engage the openings formed thereby when the carton is caused to bend at the respective fold lines 246 and 247 mentioned. The condition of the cans and the carton blank will then be as depicted in Fig. 5.

Before the gates 107 again swing up, one of the cross lugs 198 will engage the rear of the package and initiate its travel outwardly on the package conveyor 14. Immediately, the contact rods 200 and 202 of the folding bars 199 and 201 will cause the end flaps 253 and 256 respectively to be engaged thereby and folded reversely outward as shown in detail in Fig. 6. The outward bending of the end flaps 253 and 256 will cause folding on the discontinuous fold lines 252 and 255 so that the arcuate slit lines 254 and 257, respectively, will cause tabs to form in overlying relationship with the upper chimed ends of cans 103, as shown in Fig. 6. At the same time, the advancing package will cause a glue line to be applied to the upper surface of the end flap 256 by means of glue roller 208 previously described.

Now, as the package advances under continuous movement of the package conveyor 14, the undersides of the end flaps will engage the folding bars 210 and 212, as shown in Fig. 7. The bars are so curved that the end flap 253 is caused to fold reversely inward just preceding the reversed inward folding of the opposite end flap 256. The condition of the end flaps during this folding operation is substantially as shown in Fig. 7. It will be

noted that the tabs formed by the reverse folding of the curved slit lines 254 and 257 are still retained at the inner periphery of the upper chimed ends of cans 103. Now, as the folding progresses, the end flap 253 will be folded first in contact with the upper ends of cans 103, following which the shorter end flap 256 is overlapped with the glued strip overlying the upwardly facing surface of end flap 253, as shown in Fig. 8. The hold-down belt 223 then engages the edge of the cans 203 disposed to the left, as shown in Fig. 8, and holds the flap 256 downwardly against end flap 253. The hold-down bar 218 then follows the top of the package, maintaining the flaps in overlapping relation until the package progresses sufficiently under the hold-down belt 223 until the hold-down belt 236 finally engages the completed package and presses upon the glue line which is interposed between the overlapping flaps. During the period of time that the package travels underneath the hold-down belt 236, the final setting of the glue takes place and the completed package emerges from the end of the package conveyor 14. The bottom chimed ends of the cans will be properly retained in the openings formed by slit lines 248 and 249 while the upper chimed ends will be wedged in position by the tabs formed by upper curved slit lines 254 and 257. As the package proceeds on the package conveyor, the cycle is, of course, repeated with the gates 107 being again lifted into position and the retaining arms 145 and 153 again moving divergently to permit a new group of cans 103 to enter the crib structure and be confined between the walls 102 and 106 preparatory to again being released by gravity. In the meantime, of course, another carton blank 116 has progressed from the carton feeder to the position shown in Fig. 4.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions without departing from the scope of the invention.

What is claimed is:

1. Apparatus for packaging in a single wrap-around a plurality of articles such as canned goods, said apparatus comprising a shiftable carton-blank gripping portion engageable with a flat and elongated carton blank for advancing said blank from a source of supply to a predetermined position on said apparatus, an article-feeding conveyor adapted to bring articles from a supply line into a group of preselected number having contiguous upstanding row formation, a crib constituting a rectangular open bottom structure having swing-away gates hinged at the bottom side edges thereof and normally maintained in substantially horizontal article-supporting relation, said crib overlying in spaced relation a medial area of one side of a carton blank when said blank is shifted to said predetermined position and being adapted to hold a group of said articles in their upstanding contiguous row formation, a packaging mechanism having a pair of spaced abutments engageable with the under side of a carton blank in said predetermined position, means permitting said group of articles in their upstanding contiguous row formation to drop under gravity upon the medial area of said carton blank and into the space defined by said pair of spaced abutments whereby to bend and cause said carton blank to closely encompass the sides and lower ends of said grouped articles, and folding and securing means having a pair of carton-flap-engaging members disposed outwardly one to each side of the grouped articles and in a plane faced slightly beyond the upper ends of the grouped articles, one of said carton-flap-engaging members being relatively shiftable inwardly and closely over the upper ends of the grouped articles for folding and overlapping one end of the carton blank over the upper ends of the articles and the other of said carton-flap-engaging members being relatively shiftable from the other side inwardly and closely over the upper ends of the grouped articles for

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folding and overlapping the first mentioned carton end with the other end of the carton blank.

2. In apparatus for packaging a plurality of generally cylindrical chimed articles such as canned goods in a carton formed from a single sheet of material having prescored bending lines and tab-forming slits adjacent the bending lines, the combination of mechanism having a shiftable carton-blank-gripping portion engageable with an elongated flat carton blank for advancing the same from a source of supply to a predetermined position on said apparatus, an article feeding conveyor adapted to bring a predetermined number of grouped articles into contiguous row formation in endwise relation with a medial area of one side of a carton blank when said blank is shifted to said predetermined position, a packaging mechanism having a pair of spaced abutments engageable with the side of a carton blank opposite the articles in their grouped row formation, said spaced abutments being mounted for relative shifting with respect to the grouped articles and into close surrounding position with the carton blank interposed between the abutments and the articles in folded engagement to the side and at one end of each of the articles, a pair of hold-down bars

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disposed substantially horizontally outward at each side respectively of said spaced abutments and the carton-flap-engaging members, said bars being elongated, bent and extending forwardly for reversing the bent angles of the end carton flaps to their overlapping relation, said reverse bending causing tabs formed by said slits to first project inwardly and then grip the inner peripheries of the chimes of said articles, and folding and securing means disposed forwardly of said packaging mechanism with respect to the direction of travel of said articles for successively folding over the end tabs of said carton blank and securing the same together in overlapped relation snugly against the ends of the upstanding articles.

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