

Nov. 24, 1970

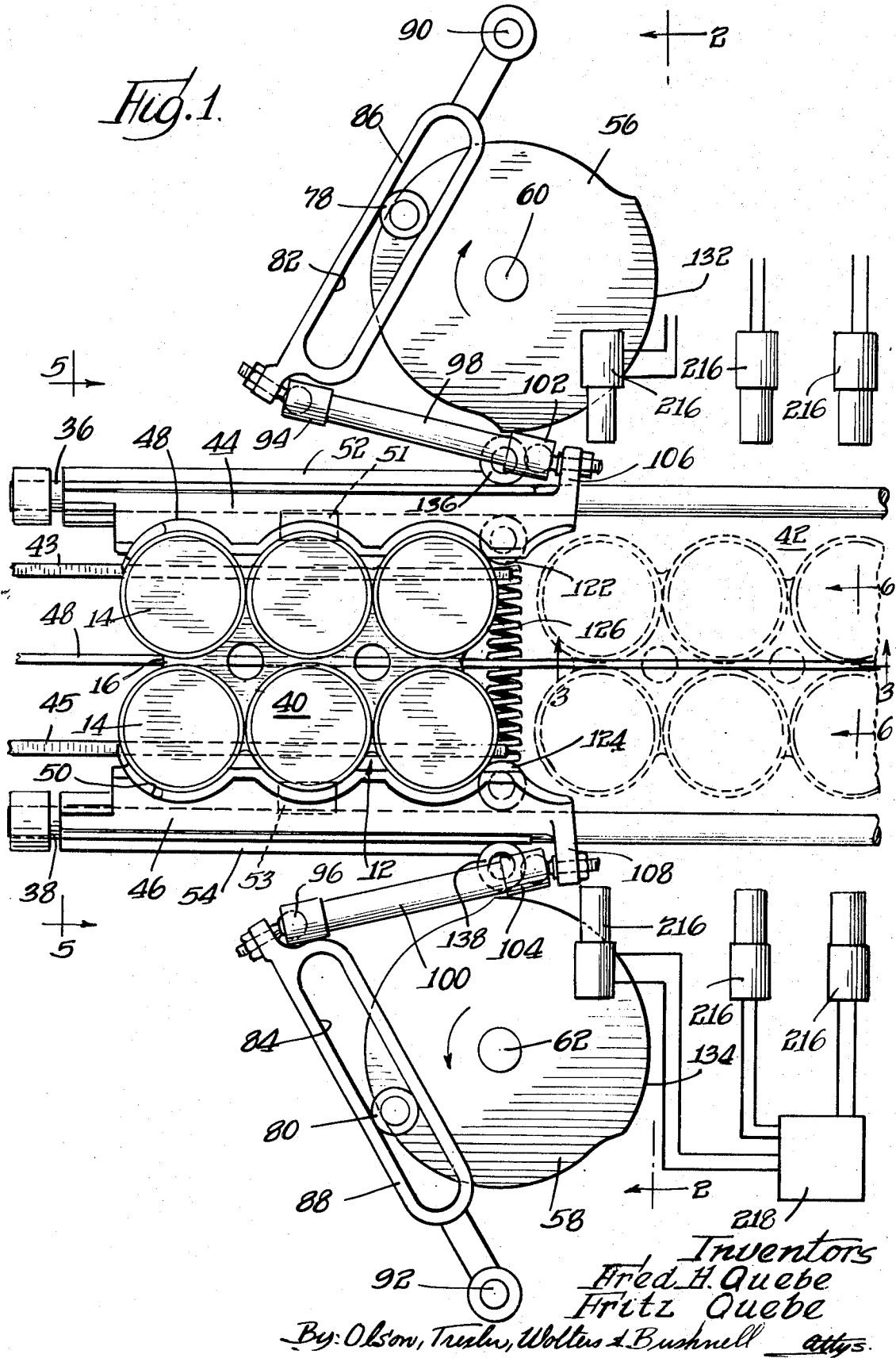
F. H. QUEBE ET AL

3,541,751

METHOD AND APPARATUS FOR PACKAGING A PLURALITY OF ARTICLES
IN PREDETERMINED ARRANGEMENT

Filed Sept. 18, 1968

4 Sheets-Sheet 1



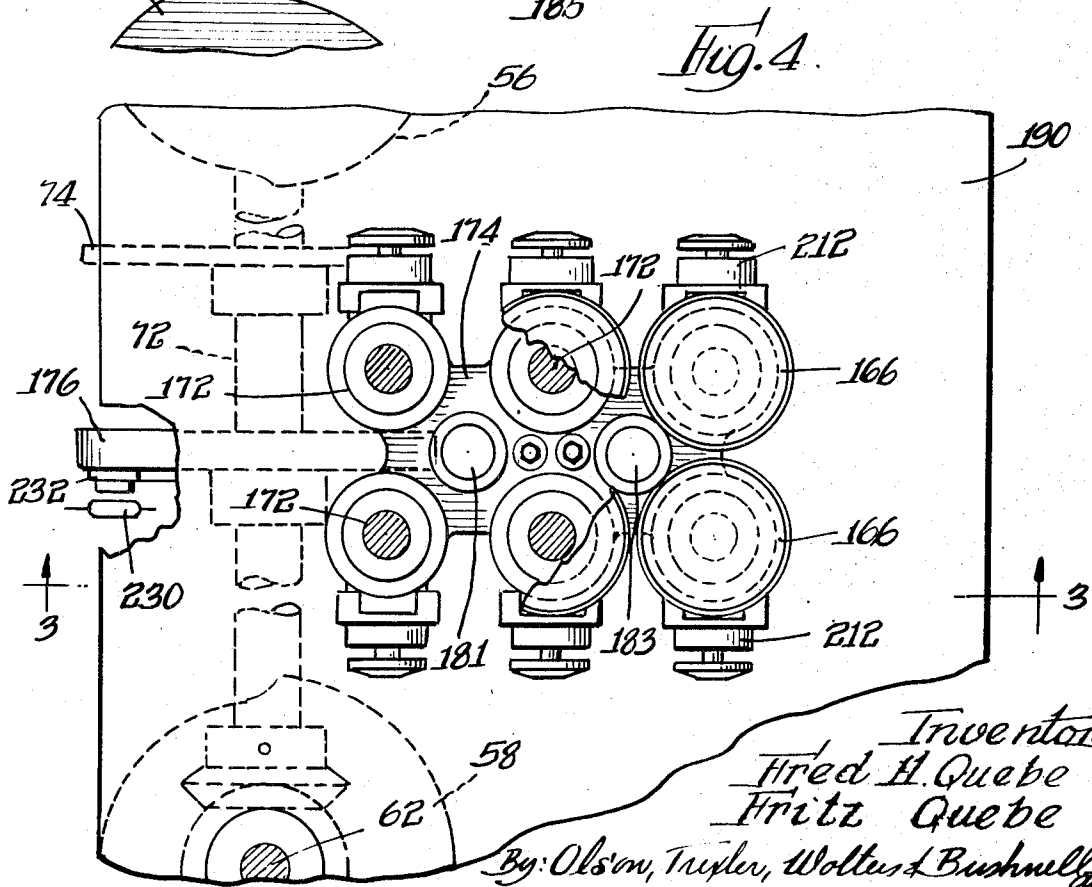
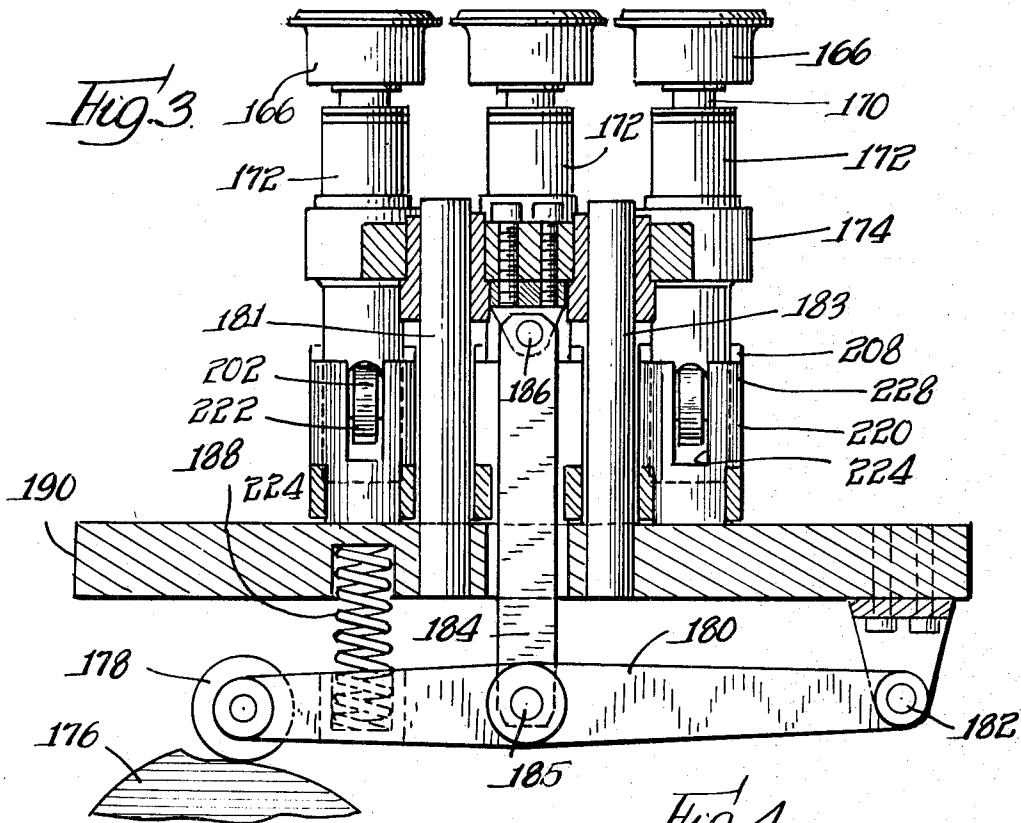
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Fig. 5.

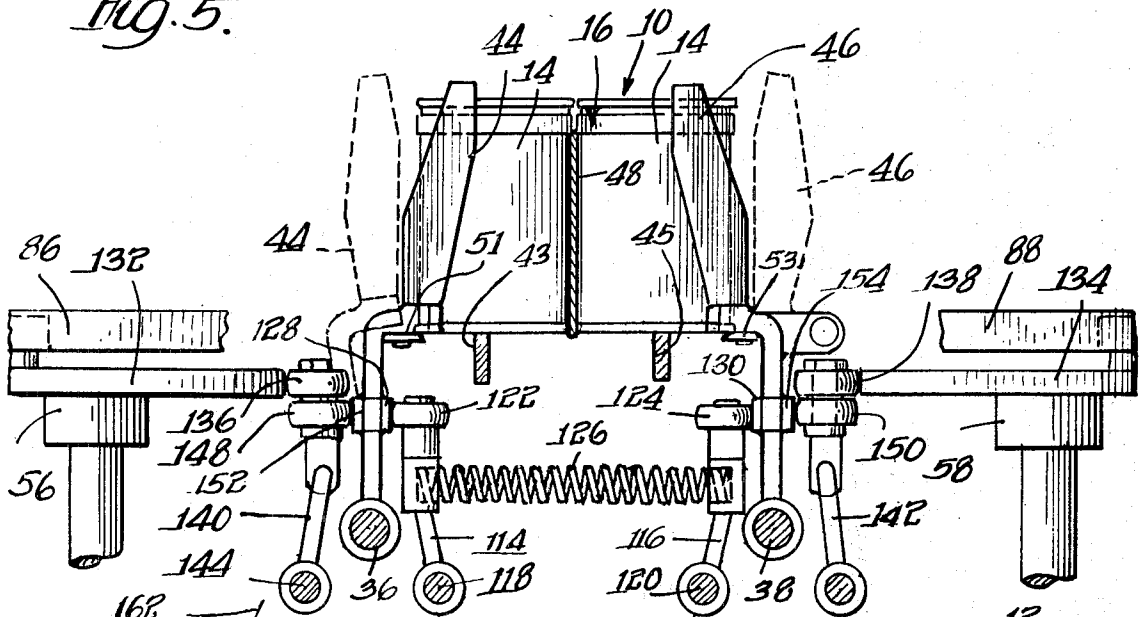


Fig. 6.

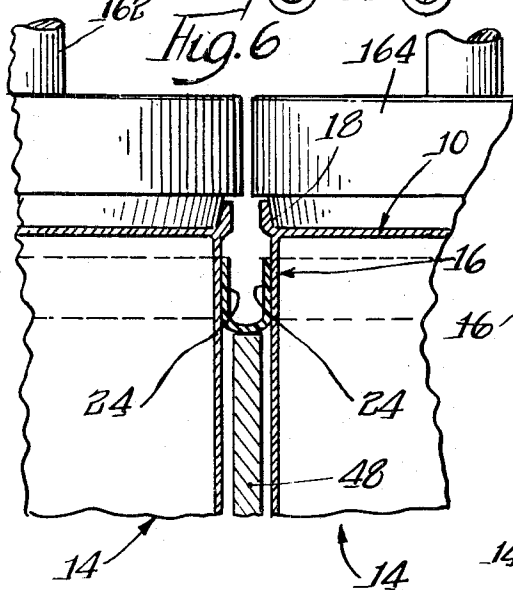


Fig. 7.

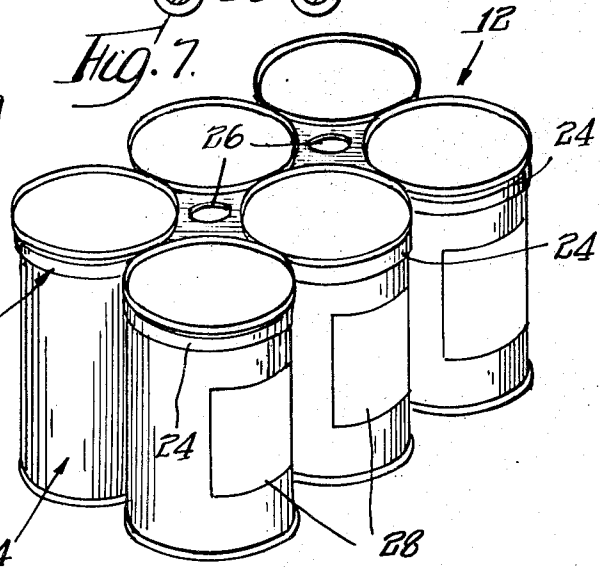
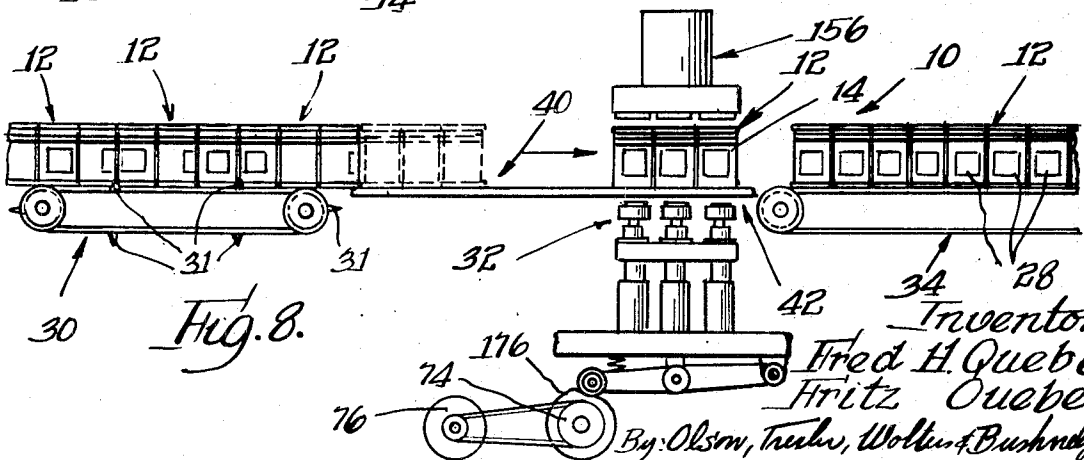


Fig. 8.



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METHOD AND APPARATUS FOR PACKAGING A PLURALITY OF ARTICLES IN PREDETERMINED ARRANGEMENT

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U.S. Cl. 53—3

16 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed a method and apparatus for packaging a plurality of articles such as cans by assembling the cans with a carrier, then engaging the cans with individual driving heads for rotating the cans to a predetermined arrangement, and then disengaging the driving heads and stopping and holding the cans in the predetermined arrangement by frictional engagement with the carrier.

The present invention relates to a novel method and apparatus for packaging articles, and more specifically to a novel method and apparatus for assembling a plurality of articles with a carrier and for orienting the articles in a predetermined arrangement.

While it is to be understood that features of the present invention may be adapted for packaging a variety of articles, one embodiment is particularly suitable for packaging beverage cans and the like and will be specifically set forth herein for illustrative purposes. As is known, articles such as cans have long been assembled in packages containing two or more such articles retained together by a carrier. A variety of carrier structures have been proposed, and certain of these comprise members formed from plastic sheet material and the like having a plurality of aperture means or pockets therein for receiving and frictionally retaining the articles. In general, these heretofore proposed carriers engage end portions of the articles so that the remainder of each article is exposed. It is frequently desirable for appearance or other reasons to have the articles in such packages oriented or arranged in a predetermined manner.

It is an important object of the present invention to provide a novel method and apparatus for packaging a plurality of cans or other articles rapidly, economically and accurately so that the articles are assembled with a packaging device or carrier and are disposed in predetermined relationship.

Another object of the present invention is to provide a novel simplified method and apparatus for obtaining a package comprising a plurality of cans or other articles and a carrier with the articles oriented in a predetermined manner.

A more specific object of the present invention is to provide a novel method and apparatus for packaging cans or other articles and adapted to turn the articles to the desired arrangement after the articles are assembled with a carrier or other packaging device.

A still further specific object of the present invention is to provide a novel packaging method and apparatus wherein a plurality of articles such as cans previously

assembled with a carrier are individually and simultaneously engaged and rotated by drive means to position the articles in predetermined arrangement, the drive means for each article being individually disengaged when such article is in the desired position and the carrier frictionally engaging the articles for stopping and retaining them in the desired position after the drive means is disengaged.

A still further object of the present invention is to provide a novel packaging method and apparatus of the above described type which may be utilized in association with presently available packaging equipment and article carriers.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a fragmentary plan view of a portion of an apparatus incorporating features of the present invention;

FIG. 2 is a fragmentary sectional view taken generally along line 2—2 in FIG. 1;

FIG. 3 is a fragmentary partial sectional view taken generally along line 3—3 in FIG. 1;

FIG. 4 is a fragmentary view taken generally along line 4—4 in FIG. 2;

FIG. 5 is a fragmentary sectional view taken generally along line 5—5 in FIG. 1;

FIG. 6 is an enlarged fragmentary partial sectional view taken generally along line 6—6 in FIG. 1;

FIG. 7 is a perspective view showing a package adapted to be assembled in accordance with features of the present invention; and

FIG. 8 is a simplified and partially schematic side elevational view showing an apparatus incorporating features of the present invention.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a packaging apparatus 10 incorporating features of the present invention as shown in simplified form in FIG. 8, which apparatus is adapted to process packages such as the package 12 which is shown best in FIG. 7. It is understood that the apparatus may be adapted for handling packages of various types of articles. For the purpose of illustrating one form of the invention, the package 12 is shown as comprising a plurality of cans 14 retained in assembled relationship by a packaging device or carrier 16.

The cans 14 are of known construction and, as shown best in FIGS. 6 and 7, each can has a radially projecting rim or bead 18 which joins its side wall 20 with its upper end 22. The carrier 16 is of a type which includes means frictionally engaging peripheral surfaces of each can, preferably under the rims thereof. In the embodiment shown, the carrier is constructed substantially in the manner disclosed in U.S. Pat. No. 2,874,835 dated Feb. 24, 1959. Reference is made to this patent for a complete description of the carrier. It suffices to state herein that the carrier 16 is preferably formed from a sheet of plastic material and has pockets or aperture means for receiving each of the articles or cans. These pockets or aperture means are defined by annular marginal portions 24 which snugly embrace and frictionally engage side surfaces of the cans, preferably beneath the rims as shown best in FIG. 6. The sheet or main body

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of the packaging device 16 may be provided with finger holes 26 or other suitable handle means so that the packaging device may function as a carrier.

It is contemplated that the articles or cans will have surface ornamentation such as labels 28 and the like. It is desired that the cans be arranged or oriented so that a particular element of the surface configuration or ornamentation faces in a predetermined direction. For example, it may be desired to have a particular part of the label 28 face outwardly so that the overall appearance of the package will be neater and more pleasing and so that a customer or user will be able to see clearly an advertising message, trademark or the like.

In accordance with a feature of the present invention, the apparatus 10 is adapted to turn and properly position the cans or articles after the articles are assembled in the package and with the packaging device or carrier 16. As indicated in FIG. 8, the apparatus 10 comprises a first continuously driven conveyor 30 for receiving the series of the packages 12 from a preceding conveyor apparatus which functions to apply the carriers to the containers. The carrier applying apparatus may be of known construction and need not be shown or described herein. The conveyor 30 has a plurality of pusher bars 31 spaced in accordance with the length of each package 12 for engaging and pushing the packages. Drive and control means including a motor, suitable drive gears, chains and the like of known construction, not shown, are provided for continuously driving the conveyor for advancing successive packages 12, usually in substantially abutting relationship, along a path of travel to and in timed relationship with a mechanism 32 which serves to turn and orient the cans as will be described in detail below. The packages with the properly oriented cans are then pushed from the mechanism 32 onto a discharge conveyor 34 which may be in the form of an endless continuously driven belt or any other suitable structure.

The mechanism 32 is shown in detail in FIGS. 1-5 and comprises a pair of guide rods 36 and 38 disposed in general alignment with the conveyors 30 and 34 and extending from a first station designated by the numeral 40 and, for convenience, identified as a clamping station, and a second station designated by the numeral 42 and identified as the positioning or orienting station (see FIGS 1 and 8). Article or can support bars 43 and 45 are mounted between the guide rods for slidably receiving the articles in a package pushed from the conveyor 30 into the clamping station 40. In addition, an upright separator plate 48 is centrally mounted between the support bars for extending between the rows of cans in each package, as shown in FIGS. 1, 5 and 6, for maintaining the cans in a predetermined separated and substantially parallel relationship. As shown in FIG. 1, the support bars 43 and 45 terminate short of the orienting station 42 while the separator panel 48 extends the length of both the clamping station and the orienting station.

As previously indicated, the packages 12 are continuously advanced along the conveyor 30 toward the station 40. The orienting mechanism is provided with clamping or transfer means for assuring proper positioning of the articles in the package at the station 40 and for accelerating this package to the station 42 sufficiently rapidly to separate this package from the next succeeding package 12 on the conveyor 30. The rapid acceleration or transfer of the package from the station 40 to the station 42 is sufficient to provide a time interval during which the cans may be turned and oriented at the station 42 while the next package is being advanced from the conveyor 30 to the station 40.

The positioning and transfer means for shifting the package from the station 40 to the station 42 comprises oppositely disposed clamp members 44 and 46 respectively having pocket portions 48 and 50 for engaging the ar-

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ticles or cans at the opposite sides of the package and shoulder elements 51 and 53 for engaging beneath the package and supporting it during movement to the station 42. The clamp members are formed with tubular portions 52 and 54 respectively slidably disposed on the guide rods 36 and 38.

In order to slide the clamping members along the guide rods 36 and 38 to and from the stations 40 and 42, cam and crank discs 56 and 58 are provided. These discs are respectively secured to upstanding shafts 60 and 62 which, as shown in FIG. 2, have beveled gears 64 and 66 fixed to lower ends thereof and driven by complementary gears 68 and 70 fixed on a common drive shaft 72. A sprocket or gear 74 is also fixed on the drive shaft and is adapted to be driven by a suitable motor 76 as indicated in simplified form in FIG. 8.

The combined cam and crank discs or members 56 and 58 respectively have crank elements or rollers 78 and 80 mounted adjacent peripheries thereof and extending into elongated slots 82 and 84 in crank arms 86 and 88, respectively. These crank arms have outer ends supported by pivot pins 90 and 92 suitably mounted at fixed positions on the frame of the apparatus. Opposite ends of the crank arms are pivotally attached by swivel coupling means 94 and 96 to connector rods 98 and 100 which have their opposite ends attached by swivel means 102 and 104 to ears 106 and 108 respectively projecting from the clamp members 44 and 46. With this arrangement it is seen that upon rotation of the discs 56 and 58, the clamp members will be reciprocated between the positions 40 and 42. The construction of these cam and crank elements is such that the drive therefor is incorporated in the previously mentioned drive and control means for the conveyor 30 so that when the clamp members 44 and 46 first engage the articles at the station 40 they are moving ahead at substantially the same lineal speed as the conveyor 30, whereupon the clamp members are accelerated to separate the engaged package from the next package.

As shown in FIG. 5, levers 114 and 116 are pivotally mounted on pivot pins 118 and 120. Ends of these levers opposite from the pivot pins respectively carry cam followers or rollers 122 and 124.

As is shown in FIG. 5, the clamp members 44 and 46 are adapted to be pivoted to broken line positions for disengagement from the articles when the clamp members are moved back from the station 42 toward the station 40.

The clamp members are normally biased to their broken line position by a compression spring 126 which extends between the members 114 and 116 as shown in FIGS. 1 and 5. The members 114 and 116, through the cam followers 122 and 124, respectively, engage cam tracks or surfaces 128 and 130 extending longitudinally along substantially the length of the clamp members 44 and 46, so as to transmit the force of the spring 126 to bias the clamp members toward the broken line position shown in FIG. 5. In order to pivot the clamp members against the action of the spring 126, the cam and crank discs 56 and 58 are respectively provided with peripheral cam surfaces 132 and 134 which engage cam followers or rollers 136 and 138 rotatably supported on levers 140 and 142. These levers are respectively mounted on pivot pins 144 and 146 adjacent the clamp members.

The levers 140 and 142 also carry cam followers or rollers 148 and 150 which engage cam surfaces or tracks 152 and 154 on and extending longitudinally for substantially the full length of the clamp members 44 and 46. With this arrangement, rotation of the discs 56 and 58 causes raised lobe portions of the cam surfaces 132 and 134 thereon periodically to pivot the levers 140 and 142 toward their respective clamp members so that the rollers 148 and 150 push the clamp members against the action of the spring 126 from the broken line position to the solid line position shown in FIG. 5. Of course, when

the cam followers 136 and 138 ride down on the lower portions of the peripheral surfaces of the discs 56 and 58, the pivotal movement of the clamp members is reversed.

The construction of the cam surfaces on the discs 56 and 58 and the cam surfaces 128, 130, 152 and 154 of the clamp members is such that as the clamp members reach the end of their movement from the advanced station 42 toward the retracted station 40, the clamp members are pivoted toward their closed position for gripping the articles or cans therebetween. Then as the clamp members are advanced for accelerating the package toward the station 42, the continued engagement between the cam surfaces 152 and 154 on the outer sides of the clamp devices and their associated cam followers maintains the clamp devices in the article engaging position. When the package is positioned at the station 42, continued rotation of the discs 56 and 58 permits the clamp members to pivot toward their open position. At the same time the clamp members are started back toward the station 40 and the cycle is repeated.

As shown in FIGS. 2 and 8, a motor unit 156 is mounted at the station 42 above the path of travel of the packages 12. This unit comprises an electric motor or other suitable prime mover 158 coupled with a speed reducer and gear train 160 having a plurality of output or drive shafts 162. The drive shafts 162 correspond in number and arrangement with the articles or cans in the package 12.

A drive member or head 164 is secured to each of the shafts 162 and has a friction end surface shaped for engagement with an end of a can or article in the package. During operation of the apparatus, the motor 158 is continuously energized so that the drive members or pads 164 are continuously driven. The articles or cans in a package at the station 42 are pressed against the drive elements or pads 164 by means described in detail below so as to accomplish turning of the cans to the desired arrangement.

The means complementing the drive unit 156 for accomplishing rotation of the articles is shown in FIGS. 2-4 and comprises a plurality of lifter elements or pads 166 respectively in axial alignment with the drive pads 164. Each member 166 is rotatably supported by a bearing 168 on an upper end portion of a spindle 170 which is axially slidably supported in a tubular sleeve 172 mounted in a lifter frame 174. The lifter frame is adapted to be raised for simultaneously engaging the lifter pads 166 against the cans and clamping the cans against the driving pads 164 for initiating turning of the cans. Each spindle 170 is adapted to be individually lowered to disengage the article or can associated therewith from the driving head when such article or can has been turned to the desired position.

In order to raise and lower the lifter frame 174, a lifter cam 176 having the desired peripheral configuration is mounted on and rotated with the drive shaft 72. The cam engages a follower 178 mounted on an end portion of a lever 180 pivotally supported at 182 as shown in FIG. 3. A connecting rod 184 extends between and is pivotally connected to the lever 180 and the lifting frame 174 by pins 185 and 186 respectively. A compression spring 188 extends between the lever 180 and a fixed frame member 190 of the apparatus for biasing the lever downwardly as viewed in FIG. 3 and maintaining the follower 178 in engagement with the cam 176. As will be understood, when the cam 176 is rotated for engaging a raised lobe portion thereof with the follower 178, the lever 180 is pivoted for raising the lifter frame 174 along fixed upstanding guide rods 181 and 183.

As previously indicated, the spindles 170 are supported so that they may be individually axially shifted downwardly relative to the lifter frame 174. As shown in FIG. 2, each spindle 170 has a lower end portion extending into a spring cup 192 slidably mounted within the sleeve

172 and housing a compression spring 194. A transverse pin 196 secures the spindle 170 with respect to the cup 192 and has end portions extending into slots 198 in the sleeve 172 so that the spindle and the spring cup 192 are capable of being moved axially in unison relative to the sleeve 172. Another spring 200 is mounted within the sleeve 172 and bears against the upper end of the cup 192 for biasing the cup and thus the spindle 170 downwardly. However, the cup and spindle are normally and releasably maintained in the elevated position shown in FIG. 2 with the pin 196 above the lower ends of the slots 198 by means of a latch 202. The latch element is pivotally mounted within the lower end of the sleeve 172 by a pin 204 and has an upper end engageable with a roller or cam follower 206 mounted on a pin 208 in a bifurcated lower end portion 210 of the spring cup.

A solenoid 212 is carried by the lifter frame and has a plunger 214 projecting for engagement with the latch element 202. The arrangement is such that when the solenoid is energized, the plunger is extended for rotating the latch element in a clockwise direction as viewed in FIG. 2 so as to disengage the latch from the roller 206. When this occurs, the spring 200 drives the spindle 170 and the lifter pad 166 downwardly so that the can being supported thereby is disengaged from the corresponding drive head 164.

The apparatus is provided with means for sensing the position of the articles or cans and for individually energizing the solenoids 212 when the cans associated therewith have been turned to a desired arrangement. This sensing means comprises photoelectric cells 216 disposed along opposite sides of the article package and respectively aimed at the individual articles or cans in the package for sensing a particular element of the label 28 on each package. The photoelectric cells are connected by suitable circuitry with a control panel 218 indicated schematically in FIGS. 1 and 2 which in turn is connected by wires 219 and 221 with the individual solenoids 212.

As previously indicated, each latch element 202 is pivoted so as to release a spindle when its associated solenoid 212 is energized. The latch elements are reset at the completion of the can orienting process when the lifter frame 174 is lowered. More specifically, each latch element has a finger portion 222 projecting into a slot 224 in a fixed stop or reset member 226. The lower end of this slot serves as one stop surface engageable with the finger element 222 and the member 226 has another stop surface 228 at the upper end thereof which is engageable with previously mentioned pin 208 which serves to support the roller 206 and also as a reset pin.

The arrangement is such that when the lifter frame 174 is lowered, the outer ends of the pin 208 which project through the elongated slots 230 in the sleeve member 172 engage the upper edge 228 of the reset stop member 226. This stops the spring cup 192 and the spindle 170 against further downward movement while the lifter frame 174 continues to move downwardly. Thus, the spindle is, in effect, raised with respect to the lifter frame back to the relative position shown in FIG. 2. At the same time, the finger 222 of the latch element 202 engages the bottom of the slot 224 so that the latch element is pivoted back into engagement with the roller 206. In the meantime, the solenoid 212 has been deenergized and the structure is now ready to repeat the cycle.

The method of processing can or article packages in accordance with the present invention is accomplished in the following manner. The packages 12 comprising a plurality of the cans or articles and the packaging devices or carriers 16 are arranged in a series and conducted along a predetermined path of travel continuously by the conveyor 30. Each successive package 12 is positively, continuously advanced at a predetermined speed by the conveyor 30 to the station 40 where it is engaged by the clamp members and accelerated to the

station 42 so as to be separated from the next succeeding package. Then the articles or cans are released by the clamp members and substantially simultaneously engaged by the lifter pads 166 which lift the cans and clamp them against the drive pads 164. The amount which the lifter frame 174 is raised is slightly greater than necessary to clamp the cans between the pads 164 and 166 and, as a result, the spring 194 associated with each of the lifter pads is slightly compressed. This arrangement insures proper clamping of the cans between the pads 164 and 166 and enables the apparatus to compensate for slight variations in the length of individual articles or cans.

The driving heads or pads 164 are continuously rotated so that as soon as the cans or articles are engaged therewith, the cans begin to rotate. A Reed switch 230 is mounted for cooperative association with a permanent magnet 232 fixed on the lifter cam 176, which switch is electrically connected with the control panel 218 so that the photoelectric cells 216 are not activated for a very short time interval which may, for example, be on the order of 0.1 sec. This time delay enables all the cans to start rotating before the photoelectric cells become effective to sense the desired spot or element on the labels. Then upon activation of the cells, rotation of the articles or cans continues. At this rotation progresses, each cell will individually sense when its associated article or can reaches the desired arrangement and a solenoid will be energized for permitting the individual lifter pad to drop downwardly so that the can is declutched from the drive pad.

The driving force applied to the articles or cans is sufficient to overcome the frictional resistance to rotation applied by the packaging device or carrier 16. However, when each can is declutched from its associated drive head, this frictional resistance serves to provide a brake against further rotation and also serves continuously thereafter to hold the can in the desired arrangement. All the cans are rotated sufficiently rapidly so that they are positioned in the desired arrangement prior to the time when the rotating lifter cam 176 permits lowering of the lifter frame 174. When the frame is lowered and the articles or cans are disengaged from all of the driving pads, the next can package is advanced by the clamp members and serves to push the processed package onto the discharge conveyor 34.

While a preferred embodiment of the present invention has been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. In a method of packaging articles, the steps comprising providing a plurality of articles preassembled with a packaging device which is to remain with the assembled articles, then rotating the articles each about its own axis sufficiently to orient each article in a predetermined position, then stopping said rotation while simultaneously frictionally engaging the articles with said packaging device for holding the articles in their respective predetermined positions.

2. A method of packaging articles, as defined in claim 1, wherein the frictional engagement of the packaging device with the articles is also accomplished prior to and during the rotation of the articles.

3. A method, as defined in claim 2, wherein said articles are disposed in side by side substantially parallel relationship and said packaging device frictionally engages sides of the articles.

4. A method, as defined in claim 3, which includes individually rotating said articles independently of each other to orient each article in said predetermined position.

5. A method, as defined in claim 4, which includes clamping opposite ends of each article between opposed portions of drive means to thereby impart rotation to the articles.

6. A method, as defined in claim 5, which includes providing a signal in response to the appearance of a predetermined element on said articles at a predetermined location for disengaging the drive means from the articles.

7. A method, as defined in claim 1, comprising providing a series of packages each of which includes a plurality of articles assembled with a packaging device, successively advancing the packages of said series along a predetermined path of travel to a work station, and performing said steps of rotating the articles, stopping and holding the articles at said work station.

8. A method, as defined in claim 7, wherein said packages in said series are advanced along said path of travel in substantially abutting relationship to a position adjacent said work station and successive packages are accelerated from said position toward said work station to separate them from the remaining packages in the series during the step of rotating the articles.

9. In an article packaging apparatus, means for advancing a preassembled package which includes a plurality of articles interconnected with a packaging device from a source of preassembled packages to a work station, drive means at said work station for rotatably driving the articles to orient each article substantially in a predetermined position and for then stopping the driving of the articles, engagement of the articles with said packaging device serving to stop and retain the articles substantially in said predetermined position when said driving has been stopped.

10. An apparatus, as defined in claim 9, wherein said drive means includes a plurality of means for individually and separately driving each of said articles.

11. An apparatus, as defined in claim 10 wherein said drive means comprises pairs of first and second oppositely disposed members for engaging opposite ends of the articles, means for driving all of said first members, and means for relatively axially shifting said first and second members for clamping the articles therebetween so that the articles are driven by said first member.

12. An apparatus, as defined in claim 11, wherein said last named means comprises a frame carrying all of said second members, means for shifting said frame toward and away from said first members, and individual means supporting each of said second members from said frame for movement between extended and retracted positions with respect to said frame for enabling the second members to be individually retracted for disengaging the articles associated therewith from the driven first members.

13. An apparatus, as defined in claim 12, which includes means releasably locking said second members in said extended positions, and individual means responsive to the position of each of said articles for actuating the locking means to release each of said second members when the article associated therewith is in the desired position.

14. An apparatus, as defined in claim 13, wherein said conveying means comprises a clamping mechanism reciprocally mounted for engaging the articles in a package and advancing the article simultaneously to a position between said first and second members of the driving means, and means for actuating the clamping mechanism in timed relationship with the driving means.

15. An apparatus, as defined in claim 9, wherein said advancing means includes a first conveyor for advancing a plurality of packages in substantially abutting relationship at a predetermined speed, and a mechanism for successively accelerating leading packages on said first conveyor to separate such leading packages from an immediately following package and for positioning such leading packages in alignment with said driving means.

16. An apparatus, as defined in claim 15, wherein said mechanism comprises a reciprocally mounted clamping device including opposing clamp members shiftable between open and closed positions, and means for reciprocating said clamping device and for closing the clamp mem-

bers during forward movement of the device and for opening the clamp members during reverse movement of the device.

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