

May 6, 1958

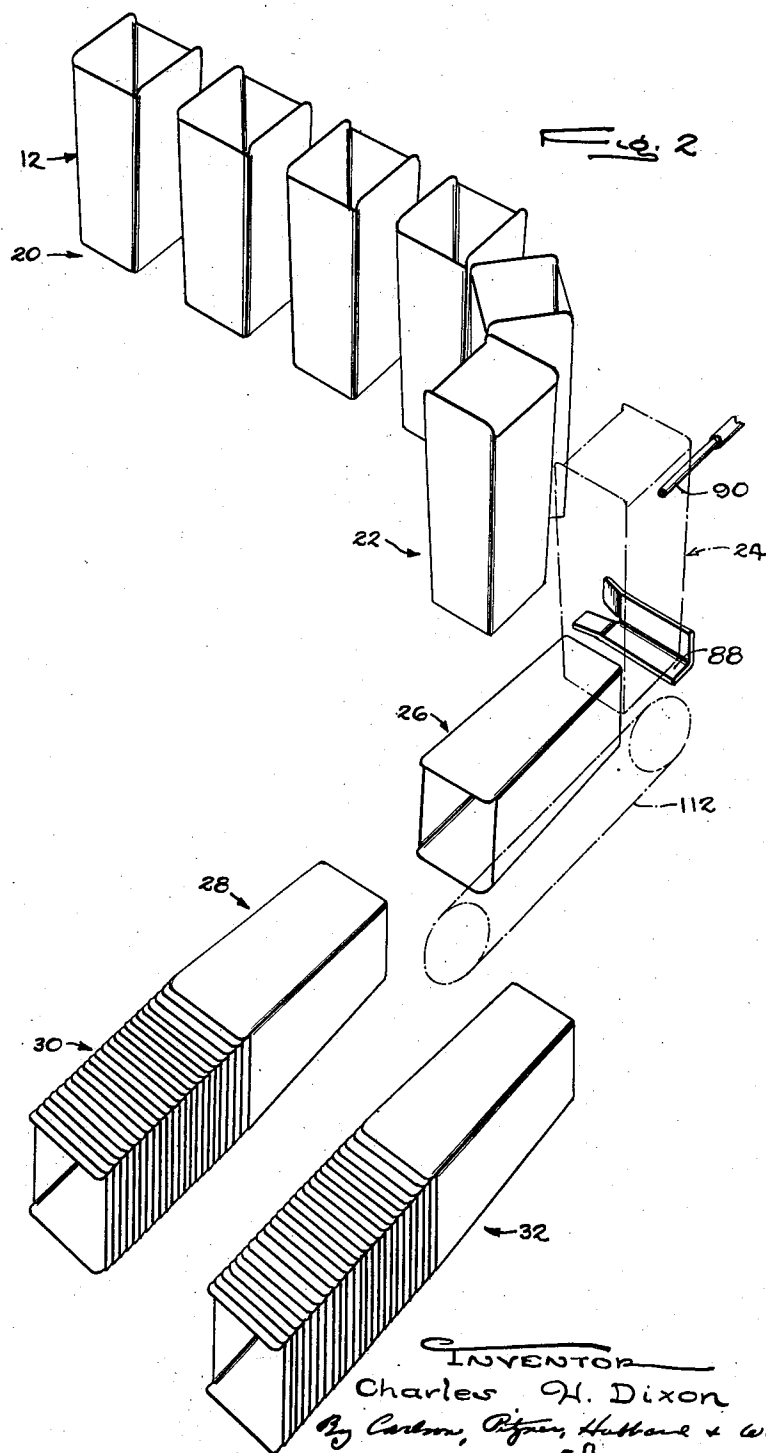
C. H. DIXON

2,833,185

CONTAINER NESTING METHOD

Filed Feb. 24, 1953

5 Sheets-Sheet 2



May 6, 1958

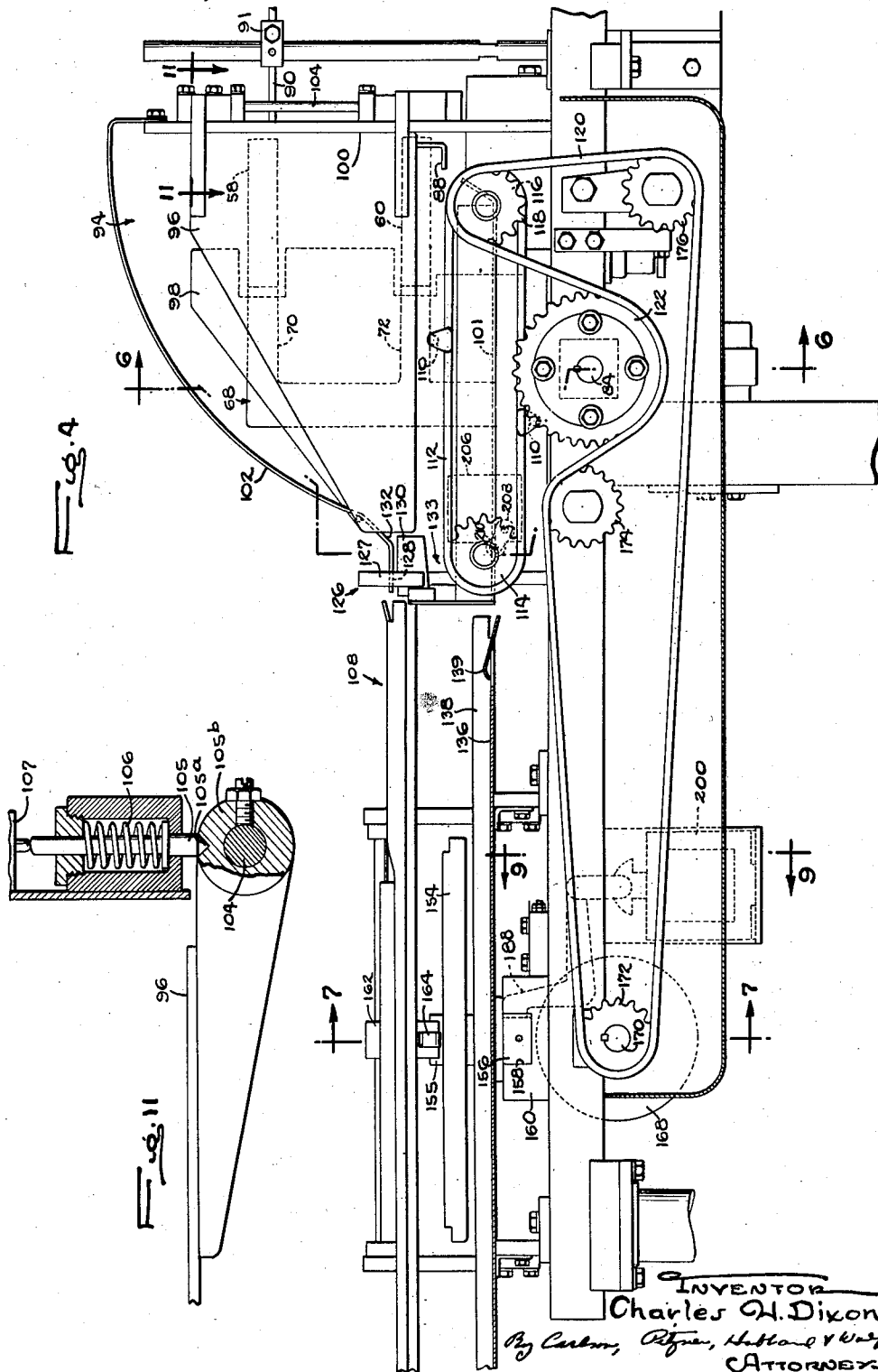
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CONTAINER NESTING METHOD

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5 Sheets-Sheet 3



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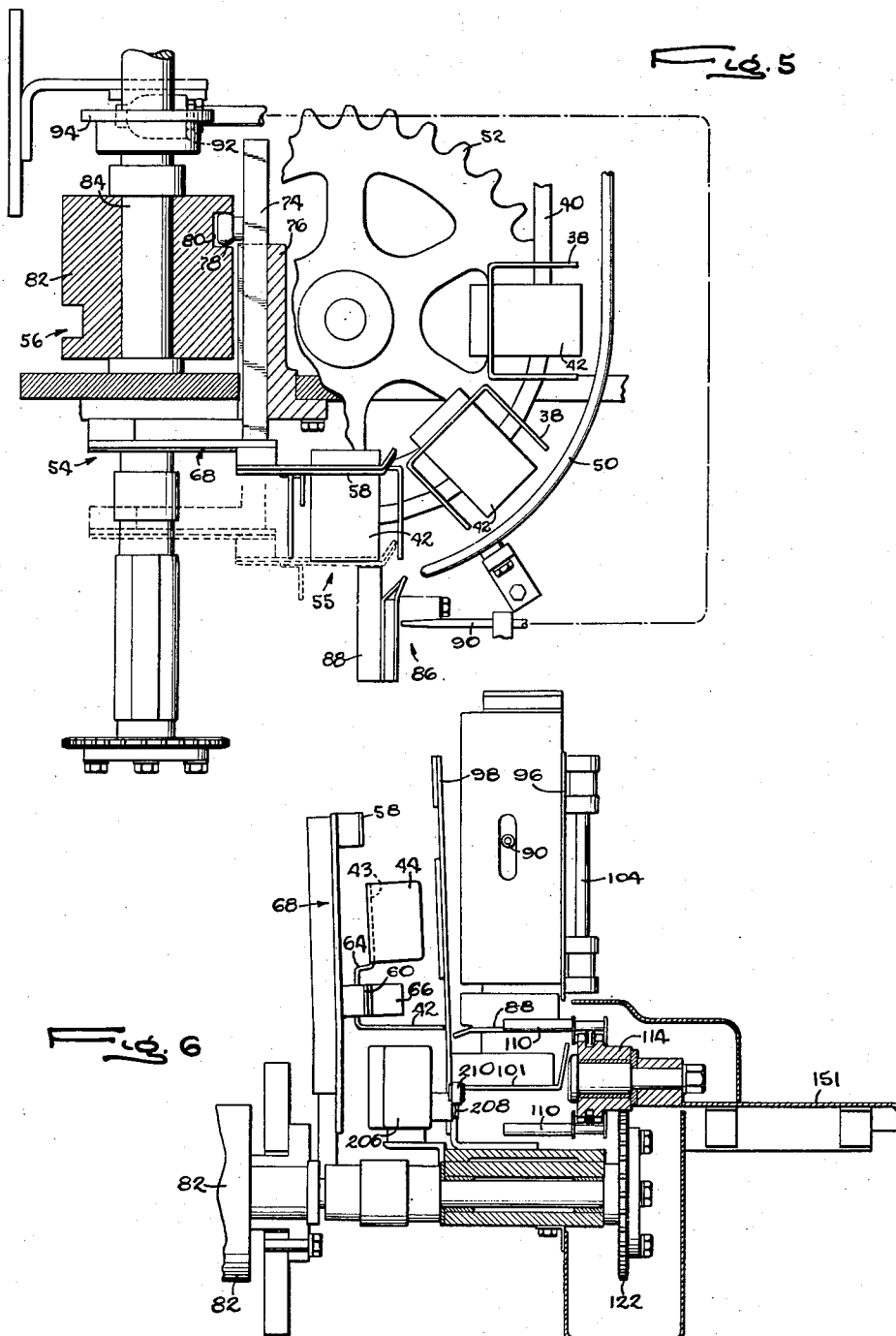
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CONTAINER NESTING METHOD

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5 Sheets-Sheet-4



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CONTAINER NESTING METHOD

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5 Sheets-Sheet 5

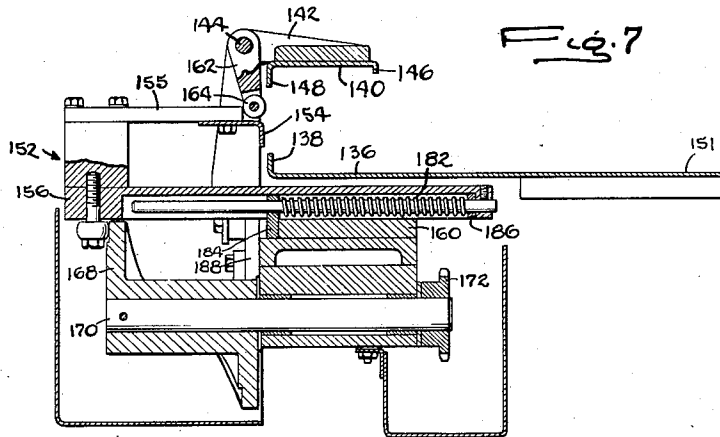


Fig. 7

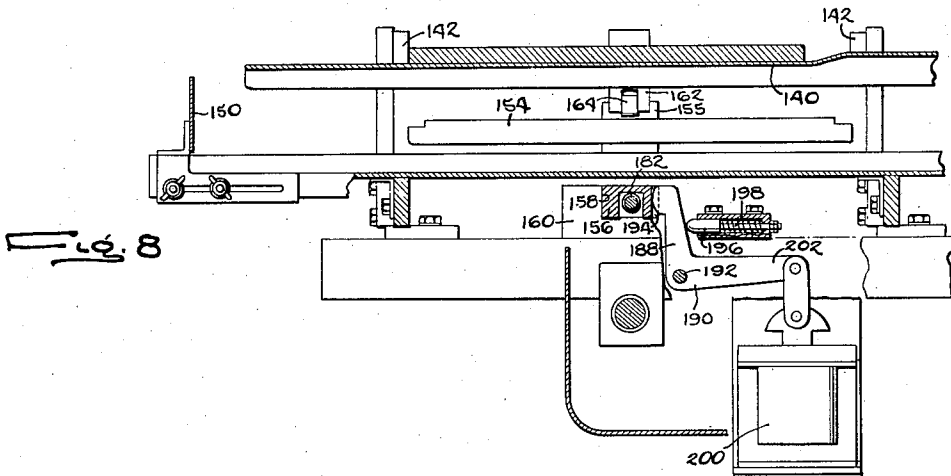


Fig. 8

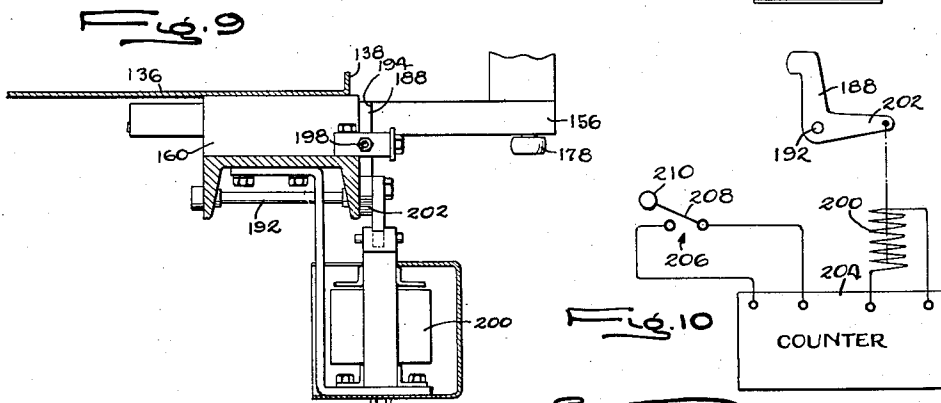


Fig. 9

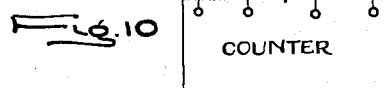


Fig. 10

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2,833,185

CONTAINER NESTING METHOD

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Application February 24, 1953, Serial No. 338,404

8 Claims. (Cl. 93—93)

This invention relates to a method of and a mechanism for nesting or stacking open-mouthed, tapered containers, particularly expendable waxed paperboard cartons intended primarily for packaging food products, such, for example, as milk and other dairy or food products.

Such milk and other products are commonly packaged in rectangular waxed paperboard cartons or containers which are provided with gable-type closures. In one method employed by many dairies and packaging plants, the cartons are formed, waxed, filled, closed and sealed by a single large machine. For this type of operation, it is the usual practice to employ cartons having straight untapered sides. Ordinarily, the cartons are formed from flattened tubular blanks which may readily be shipped to the packaging plants.

There is an alternative method of operations in which less equipment is needed at the packaging plants. In this alternative method, the cartons are formed and waxed at converting plants, so that only the filling, closing and sealing operations need be carried out at the packaging plants. The cartons may be made in tapered form so that they can be nested into compact stacks for economical shipment from the converting plant to the packaging plants.

While the present invention has many applications, it finds particular utility in connection with a machine adapted to form, wax and nest tapered single-service cartons. Such a machine may include a forming and waxing mechanism similar to that disclosed and claimed in U. S. Patent No. 2,367,884, issued January 23, 1945, on the application of Charles Z. Monroe. In addition, the machine may include a nesting mechanism constructed in accordance with this invention.

An object of the invention is to provide a container nesting mechanism for receiving a continuous succession of tapered cartons or containers and delivering a continuous succession of container stacks, each including a predetermined number of uniformly nested containers.

A related object is to provide a nesting mechanism which is completely automatic, in the sense that its continued operation does not depend upon the manual performance of any operation.

It is another object to provide a method of nesting upright containers so as to form horizontal stacks.

A further object is to provide a mechanism adapted to receive containers disposed in vertical positions and to nest the containers in horizontal stacks.

Other objects and advantages of the invention will appear from the following description taken with the accompanying drawings in which:

Fig. 1 is a perspective view of one type of tapered carton or container which may be nested in accordance with the present invention.

Fig. 2 is a diagrammatic perspective view illustrating an exemplary nesting method in accordance with the invention.

Fig. 3 is a plan view of an illustrative nesting mechanism constructed in accordance with the invention,

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the mechanism being embodied as part of a carton manufacturing machine.

Fig. 4 is an elevational view of the nesting mechanism, with certain parts broken away.

Fig. 5 is a fragmentary plan view showing a portion of the nesting mechanism.

Fig. 6 is a sectional view taken generally along the line 6—6 in Fig. 4.

Fig. 7 is a sectional view taken generally along the line 7—7 in Fig. 4.

Fig. 8 is a fragmentary sectional view taken generally along the line 8—8 in Fig. 3.

Fig. 9 is a fragmentary section taken along the line 9—9 in Fig. 4.

Fig. 10 is a circuit diagram of a counting arrangement forming a part of the nesting mechanism.

Fig. 11 is a fragmentary horizontal sectional view taken generally along line 11—11 in Fig. 4.

While the invention is susceptible of various modifications and alternative constructions, there is shown in the drawings and will herein be described in detail the preferred embodiment, but it is to be understood that it is not thereby intended to limit the invention to the particular form disclosed, but it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Considered more particularly, Fig. 1 illustrates an exemplary container or carton 12 which may be nested in accordance with the present invention. As shown, the container 12 is closed at the bottom and open at the top. In cross-section it is square. The container 12 has four side walls 14 which taper downwardly so that one container may be nested in another. In this way, compact stacks of the containers may readily be formed.

Two pairs of diametrically opposite scored panels 16 and 18 are provided at the upper end of the container 12 to facilitate the formation of a gable-type closure, which may, for example, be of the type disclosed in Patent No. 2,288,914, granted July 7, 1942, on the application of Charles Z. Monroe. The panels 18 are scored in such a manner that they may be tucked inwardly between the panels 16. The latter are adapted to be folded inwardly and stapled together at their upper edges.

Containers of the type shown in Fig. 1 may advantageously be employed to package a wide variety of food products, particularly milk and fluid dairy products. For such service, the containers are ordinarily made of waxed paperboard.

Containers of the type shown in Fig. 1 may be formed by a machine which is similar to that disclosed in the above identified Monroe patent, No. 2,367,884, but which has been modified somewhat to accommodate tapered containers. The machine is supplied with flattened tubular paper blanks having erect top and bottom flaps, and is operative to open or erect the blanks into tubular form, fold the bottom flaps inwardly, and impregnate the entire container with paraffin, the bottom flaps being sealed either by the paraffin or by some other suitable adhesive applied prior to the paraffining operation.

However, the present invention is not directly concerned with the formation of the paper containers, but rather with nesting the containers after they are formed in open condition ready for filling, so that they may be conveniently shipped in compact stacks.

After being nested in accordance with this invention at one location, the containers may be shipped to another location where they may be denested, filled and sealed. The denesting operation may be carried out by a mechanism constructed in accordance with the invention,

anism of the type disclosed in my co-pending application, issued May 21, 1957, as Patent No. 2,792,967.

Fig. 2 illustrates a nesting method which exemplifies the present invention. As a preliminary to the nesting operation, the containers 12 are advanced in single file, as shown at 20, the file turning at its leading end. In this step of the method, the containers are disposed in upright position. When each of the containers reaches a predetermined position, as shown at 22, it is moved laterally out of the trailing line of containers into a position indicated at 24. At this point, each successive container is toppled over forwardly on its side, as indicated at 26, preferably in a direction parallel to the direction in which it was traveling at the time of lateral displacement at 22 out of the line.

The toppled container, now in a horizontal position, is moved endwise, preferably mouth foremost as shown. The container is moved in this manner a distance greater than its own length so that the immediately following container also may be toppled into the position 26 without obstruction. After the first container of the sequence has reached a position indicated at 28, the succeeding containers are moved into nested relationship therewith to form a container stack 30. It is desirable to square up the mouth of each container as it is added to the stack, so that the nesting operation may readily be accomplished. Each of the containers is moved through the same distance to nest it with the last of the preceding containers, the stack as a whole being advanced step-by-step as each container is added thereto. The resistance offered by the stack to this advancing movement results in firm and compact nesting of the containers.

The containers are counted as they are nested, and after the desired number of containers has been accumulated in the stack 30, the latter is ejected laterally, so that the next succeeding containers can form a new stack. The ejected stack, shown at 32, may be bagged or otherwise packaged for shipment.

The invention is further exemplified in Figs. 3-10, which show an exemplary nesting mechanism 34 whereby the above-outlined method may advantageously be carried out. The nesting mechanism 34 may be arranged for use as part of a complete container forming and nesting machine, but the container-forming portion of the machine is not shown since per se it forms no part of the present invention. Suffice it to say that the containers are formed, waxed and then deposited on a conveyor 36 (Fig. 3) which carries them through a cooling box (not shown), in order to solidify the wax. The conveyor 36 carries the containers in single file to the succeeding elements of the nesting mechanism 34.

As shown, the conveyor 36 comprises a plurality of three-sided baskets or pockets 38, carried at equally spaced points on an endless chain 40. Each pocket 38 has a horizontal lower wall 42 to support the inserted container, an inner side wall 43, and partial front and rear side walls 44 and 46, the outer side of the pocket being open. To maintain the containers in the pockets, a parallel rail 50 is disposed adjacent the outer side of the conveyor 36.

At the terminal end of the conveyor 36, the chain 40 passes around a horizontal idler sprocket 52, and, as a result, causes the line of containers to curve at right angles. Approximately half way around the sprocket 52, the containers reach an ejection station 55. An ejecting mechanism 54 is provided at this point for ejecting the containers from the successive conveyor pockets 38. The rail 50 terminates just short of the ejection station 55 so as to permit lateral displacement of the containers out of the pockets 38 at this point.

A driving mechanism (not shown) of suitable construction may be provided for advancing the conveyor 36 in step-by-step sequence so that each of the successive pockets 38 upon reaching the ejection station or position 55 will dwell therein for a brief timed interval during which the associated containers will be displaced therefrom.

The conveyor driving mechanism may be of the type shown in Fig. 3 of Monroe Patent No. 2,368,483.

In the preferred form illustrated, the container ejecting mechanism 54 includes a pusher 56 (Figs. 5 and 6) having a pair of horizontally disposed vertically spaced ejecting fingers or paddles 58 and 60, which are respectively disposed above and below the partial side walls 44 and 46 of the conveyor pockets 38. The inner wall 43 of each of the pockets has a portion 64 which is offset inwardly of the sprocket to provide a recess for the lower ejecting finger 60, so that the latter may be retracted into a position of substantial alignment with the upper part of the inner wall 43. The finger 60 is provided with a stop 66 projecting outwardly at right angles therefrom, adjacent the front wall 44 of the particular pocket 38 which is in the station 55. As will appear in detail shortly, the stop 66 maintains the containers in an upright position as they are ejected from the pockets 38.

The ejecting fingers 58 and 60 are mounted on a generally E-shaped supporting member 68 (Figs. 4 and 5) having upper arms 70 and 72 connected to the fingers 58 and 60. The lower end of the E-shaped member 68 is connected to a slide 74 mounted in a supporting bearing 76 for longitudinal reciprocation therealong.

Provision is made for reciprocating the pusher 56 in timed relation to the step-by-step advancing movement of the conveyor. For this purpose, the slide 74 is provided with a follower roller 78 disposed in a cam groove 80 formed in a barrel cam 82. The latter is mounted on a shaft 84 which is driven (by means not shown) at a constant speed in synchronism with the conveyor drive. The cam groove 80 is shaped so as to hold the pusher 56 in its retracted position, shown in full lines in Fig. 5, as the conveyor pockets 38 are successively indexed into the container ejecting station 55. As each of the conveyor pockets 38 dwells in the ejecting station 55, the cam groove advances the pusher to eject the container from the pocket, and then retracts the pusher preliminary to another indexing movement of the conveyor.

Provision is made for toppling the upright containers into horizontal positions, as they are successively ejected from the conveyor 36. For this purpose, a toppling arrangement 86 is provided, comprising a narrow shelf 88 positioned to support one of the bottom edges of each of the containers upon its ejection from the conveyor. As illustrated, the shelf extends outwardly away from the open side of the particular pocket 38 which is disposed in the ejecting station 55, and is disposed at or slightly below the level of the lower wall 42 of the pocket. The width of the shelf is such that only about one-third of the bottom of the ejected container is supported thereby. The stop 66 on the ejecting finger 60 maintains the container in an upright position as it is advanced onto the shelf by the pusher 56. However, when the pusher is retracted by the cam 82, the container will topple off the shelf to the left (Fig. 5).

Optionally, the gravitational toppling action brought about by the shelf 88 may be supplemented by directing an air blast against the container after the latter has been moved onto the shelf. To this end, the illustrated nesting mechanism is provided with a horizontal nozzle 90 disposed above the level of the shelf 88 and directed to the left as seen in Figs. 4 and 5. The nozzle is mounted on a vertically adjustable support 91 whereby its height may be adjusted so that containers of various heights may be effectively toppled by the air blast by means of an air valve 92, operated by a cam 94 on the shaft 84, compressed air may be supplied to the nozzle 90 in timed relation to the operation of the pusher 56. The supplementary toppling action effected by the air blast is desirable mainly when the machine is to be operated at a relatively high speed. For low speed operation, the toppling action of the shelf 88 is sufficiently responsive.

The shelf 88 is disposed at the right-hand end of an enclosure 94 which guides the container as it topples off

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the shelf. This enclosure comprises a pair of downwardly converging front and rear walls 96 and 98 (Fig. 3), the former being vertical and the latter in this instance being steeply sloping. In addition, the enclosure includes a generally vertical right-hand wall 100, a floor 101, and an upper wall or hood 102 arching downwardly to the left as seen in Fig. 4.

The front wall 96 of the enclosure 94 is arranged so as to constitute a jam gate, and accordingly is hinged adjacent its right-hand end on a vertical pivot 104, for outward swinging movement away from the conveyor 36. Provision is made for yieldably restraining the wall or jam gate 96 against such outward movement, so that the jam gate will swing away from the conveyor only in the event that one of the containers becomes lodged in the enclosure 94 instead of being carried out of the enclosure in the normal manner. In this event the jammed container will be forced against the jam gate 96 by the next succeeding container to be ejected from the conveyor, and the gate will thereby be swung outwardly so as to relieve the pressure on the containers and prevent damage to the mechanism.

In the illustrated embodiment, the means for yieldably holding the gate in its normal position comprises a slidable plunger 105 which normally engages a recess or depression 105a in the periphery of a collar 105b fixed to the pivot 104. A spring 106 is provided to bias the plunger 105 against the collar 105b. In order to stop the operation of the nesting mechanism in the event that the jam gate 96 should be swung outwardly, a control switch 107 is mounted adjacent the rear end of the plunger 105 so as to be operated by rearward movement of the plunger. If the jam gate should be swung outwardly, the plunger 105 will be cammed rearwardly out of the depression 105a in the collar 105b. This will operate the switch 107 and stop the machine.

As each container topples off the shelf 88, it is guided downwardly into a horizontal position by the downwardly converging walls 96 and 98. The floor 101 then supports the toppled container in a generally horizontal position.

Provision is made for sliding the successively toppled containers endwise out of the enclosure 94 into a generally tubular magazine or accumulator 108. In the illustrated embodiment, the toppled containers are moved, preferably mouth foremost, by pusher pins 110 carried on an endless chain 112. The latter runs in horizontal flights between a pair of sprockets 114 and 116 which are disposed at such an elevation that the consecutive push pins thereon will engage the bottoms of the successively toppled containers.

The chain 112 is adapted to be driven at a constant speed by means of a sprocket 118 secured for rotation with the sprocket 116. A drive chain 120 connects the sprocket 118 to a drive sprocket 122 mounted on the shaft 84. It will be recalled that the latter is also connected to operate the mechanism 54 which ejects the containers from the conveyor. In this way, the action of the pushers 110 is timed with respect to the arrival of the containers in the enclosure 95.

Provision is made for squaring up the tops of the successive containers as they enter the magazine 108 so that they may be readily nested over the preceding containers of each stack. In some cases, the mouths or open ends of the containers may be somewhat diamond-shaped, rather than perfectly square, due to a tendency of the containers to retain or assume their initial flattened form. To obviate this possible difficulty, the containers are passed through a die-like squaring device 126, disposed between the enclosure 95 and the magazine 108. The squaring device 126 (Figs. 3 and 4) comprises a support 127 having a rectangular opening 128 which is barely large enough to pass the containers. The opening is provided with a tapering, funnel-like entrance, formed by a pair of flaring side guide members 130 and an upwardly

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flared top guiding element 132, the latter being formed as part of the hood 102. In moving along the elements 130 and 132, the mouth of each container is squared up so that it can pass through the opening 128. The squaring device is cut away at 133 to permit passage of the pusher pins 110.

The illustrated magazine 108 (Figs. 7-9) comprises a floor or lower wall 136 having an upstanding longitudinal flange 138 along its rear edge. Adjacent the entrance to the magazine, the floor 136 thereof is provided with an upwardly extending projection 139 adapted to support the small end of the container stack in a slightly elevated position so that the main axis of the stack will be level and in alinement with the opening 128 in the squaring device. Disposed above the lower wall 136 is an upper wall 140 which is carried on a pair of forwardly extending horizontal arms 142 mounted on a pivot shaft 144 which extends longitudinally of the magazine 108. A pair of depending longitudinal flanges 146 and 148 are provided along the front and rear edges of the upper wall 140. These flanges co-operate with the upstanding flange 138 on the lower wall to retain the nested containers in the magazine.

To limit the longitudinal movement of the nested containers along the magazine 108, an upstanding adjustable stop 150 is mounted at the left-hand end thereof, as seen in Fig. 8.

Provision is made for ejecting the stack of nested containers from the magazine 108 after a predetermined number of containers has been accumulated therein. The actual number of containers which may be accumulated in a single stack will depend upon whether quart, pint or half-pint containers are being nested. Containers of these various sizes will differ in over all height but ordinarily not in their other dimensions. In this instance, the containers are ejected onto a packer's table 151 located in front of the magazine 108. The ejected stacks may be packaged in elongated bags, which may be stored on a side table 153.

Ejection of each stack is accomplished in this instance by an ejecting mechanism 152 including an elongated reciprocable pusher plate 154 extending parallel to the magazine, and normally positioned just to the rear thereof. The pusher plate is mounted on the front end of an elongated member 155 which is fixed at its rear end to a slide 156. The latter is slidably received in a way groove 158 formed in a supporting block 160 and extending from front to rear therein at right angles to the longitudinal axis of the magazine. The pusher plate 154 is thus movable forwardly between the upper and lower magazine walls 136 and 140.

Provision is made for releasing the stack of nested containers from the magazine when the pusher plate 154 is moved forwardly. For this purpose, the pivoted upper wall 140 is provided with a depending actuator arm 162 mounted on the shaft 144. The arm 162 extends downwardly into the path of the pusher-supporting member 155, and is provided with a roller 164 engageable thereby. When the slide 156 moves forwardly from its normal position, the member 155 immediately pushes the actuator arm 162 forwardly and thus raises the upper wall of the magazine. The roller 164 rides along the upper surface of the member 155 until the pusher is returned to its normal, retracted position.

The slide 156 is reciprocated intermittently by means of a barrel cam 168 mounted on a shaft 170 which also carries a sprocket 172. The latter is driven at constant speed by the chain 120. It will be recalled that the latter also drives the sprocket 118 for the pusher chain 112. The chain 120 runs on a pair of idler sprockets 174 and 176, in addition to the sprockets 118, 122 and 172. The sprocket 176 is utilized for adjusting the tension in the chain. Formed on the barrel cam 168 is an endless generally helical cam ridge which runs from one end of the cam to the other and then back again. A follower roller

is mounted on the slide 156 for engagement with the rear surface of the ridge. The slide is biased forwardly by a compression spring 182, disposed between a stationary abutment 184 and an abutment 186 on the front end of the slide.

The mechanism thus far described would tend to reciprocate the slide continuously. However, the slide is normally latched in a position just forward of the rearmost point in its reciprocatory cycle, as shown in Fig. 7. This is accomplished by means of an upwardly extending latching arm 188 on a bell crank 190, the latter being carried on a pivot shaft 192 extending parallel to the axis of the slide. The latching arm 188 has a projecting portion which is normally received in a vertical latching groove 194 formed in the right-hand side of the slide as seen in Fig. 8. The arm 188 is biased against the slide by means of a horizontally slidable plunger 196 pressed against the arm by a compression spring 198.

Provision is made for releasing the slide 156 periodically for reciprocation through a single cycle, after the desired number of containers has been nested in the magazine 108. This is accomplished, in the present case, by means of a solenoid 200 connected to a generally horizontal arm 202 on the bell crank 190. When energized, the solenoid rocks the bell crank clockwise (Fig. 8) so as to disengage the latching arm 188 from the groove 194 in the slide 156. The spring 182 thereupon is effective to move the slide 156 forwardly so that the cam roller 178 follows the cam ridge 180 through a reciprocatory cycle.

The solenoid 200 is periodically energized for a brief interval by means of an electrical counter 204 (Fig. 10) which counts the containers as they are nested. The counter is controlled by a switch 206 which is operated by a pivoted arm 208 extending upwardly through the floor 101 of the enclosure 95, near its exit or left-hand end (Fig. 3). The arm carries a roller 210 which is engaged by the containers as they are successively ejected from the enclosure. Since the electrical counter 204, in itself, forms no part of the present invention, it will not be herein shown or described in detail. For a detailed description of a suitable counter, reference may be had to the co-pending application of James F. Earp, issued February 28, 1956 as Patent No. 2,736,149.

It will be understood that the slide 156 is normally latched against forward movement at a point slightly forward of the extreme rearward position to which it is carried by the barrel cam 168. Thus, during a small portion of each revolution of the cam, the slide is moved slightly rearwardly from its latched position. This has the effect of relieving the forwardly directed pressure exerted on the latching arm 188 by the groove 194 in the slide 156. The counter 204 is timed so as to energize the solenoid 200 when the pressure between the latching parts is thus relieved.

With this arrangement, the unlatching operation is carried out with a minimum of frictional resistance. There is no sudden, uncontrolled forward movement of the slide, because the cam ridge 180 is in contact with the follower roller 178 when the slide is unlatched. The solenoid remains energized until the slide 156 has moved forward beyond the position in which it is normally latched. Thereafter, the counter is operative to deenergize the solenoid 200, whereupon the spring 198 returns the latching arm 188 into engagement with the right-hand side of the slide. Under the impetus of the spring 182, the slide 156 follows the cam ridge forwardly and is returned thereby. Just prior to the end of the rearward return stroke of the slide, the latching groove 194 comes into registration with the latching arm 188, whereupon the latter is moved into the groove by the spring 198 so that the slide is again latched against forward movement, until the solenoid is again energized by the counter 204.

The forward movement of the slide 156 raises the upper wall 140 of the magazine, and the stack of containers is

thus released, so that the pusher 154 can eject the stack onto the packer's table 151. At the end of the rearward stroke of the slide, the member 155 releases the actuator arm 162, whereupon the upper wall of the magazine returns by gravity to its normal position shown in Fig. 7. The stack-ejecting mechanism 152 is timed so that the forward and reverse strokes of the pusher plate 154 occur in the elapsed time between the completion of the ejection of one container from the enclosure 95 and the beginning of the ejection of the next container.

In summarizing the operation of the nesting mechanism it will be assumed initially that the mechanism has just been put into operation and that freshly formed and waxed containers are being placed in the successive conveyor pockets 38. The conveyor 36 advances in step-by-step fashion with alternate intervals of movement and dwell, the containers thus being brought successively into the unloading position 55. During the dwell periods of the conveyor, the ejecting fingers 58 and 60 push the successive containers out of the conveyor pockets 38 onto the narrow, off-center shelf 88 in the enclosure 95. Each container topples off the shelf 88 to the left, being guided downwardly by the converging front and rear walls 96 and 98 of the enclosure. If the nozzle 90 is in operation, the timed air blast therefrom supplements the toppling action of the shelf.

After coming to rest upon the floor 101 of the enclosure 95, the container is engaged by one of the pusher pins 110 on the chain 112, and is pushed thereby, mouth foremost, through the die-like squaring device 126 into the magazine 108. As the container is ejected from the enclosure 85, it trips the counter roller 210 and thereby is registered on the counter 204.

The successive containers are telescoped over their predecessors in the magazine, and in this way a stack of nested containers is built up. The stack as a whole moves along the magazine to the left (Fig. 4), as the successive containers are added to its right-hand end.

After a predetermined number of containers have been nested in the stack, the counter energizes the solenoid 200, and the latter withdraws the latch 188 from the groove 194 in the slide 156. With the slide thus released, the roller 178 thereon follows the barrel cam 168, under the urging of the spring 182. The resulting forward movement of the slide raises the upper wall 140 of the magazine 108 so that the pusher 154 on the slide will eject the stack. On the subsequent return stroke of the slide, the upper wall returns to its normal position and the slide is re-latched in its retracted position, shown in Fig. 7, the solenoid 200 having been energized only momentarily.

The stack ejecting operation takes place as the next container is being ejected from the conveyor and toppled within the enclosure 95. After the pusher plate 154 has returned to its rearwardly withdrawn position, this container is pushed from the enclosure 95 into the magazine 108 to begin a new stack.

I claim as my invention:

1. In a mechanism for nesting tapered containers, the combination comprising a conveyor for delivering the containers successively in an upright position to a predetermined point, means for ejecting the containers off said conveyor at said point and supporting them upright during ejection, a shelf for receiving the containers in off-center relation from said conveyor so that each container will topple off said shelf onto its side by its own weight, a magazine, means for moving the toppled containers endwise into said magazine in nested relation to form a stack, means for counting the nested containers, and means for ejecting the stack laterally from said magazine after a predetermined count on the last-mentioned means.

2. In a mechanism for nesting tapered containers, the combination comprising a conveyor for delivering containers successively in an upright position to an ejection

station, a shelf adjacent the ejection station for receiving one bottom edge of each container in upright position while leaving the remainder of the container unsupported so that the latter after delivery thereto will topple off said shelf from a vertical into a generally horizontal position, retractable means at said ejection station for sliding the containers in upright position successively onto said shelf, and means for moving the toppled containers endwise into nested relation.

3. In a mechanism for nesting tapered containers, the combination comprising a conveyor for delivering containers successively in an upright position to an ejection station, a narrow horizontal shelf adjacent the ejection station for supporting a minor fraction of the bottom of an upright container so that the latter will topple off said shelf into a generally horizontal position, retractable means at said ejection station for moving the containers supported in upright position successively onto said shelf, means for directing a stream of air against the container when on said shelf timed to augment the toppling action thereof, and means for moving the toppled containers endwise into nested relation.

4. In a mechanism for nesting tapered containers, the combination comprising a conveyor for carrying the containers in upright position, said conveyor having a plurality of spaced pockets movable successively into an unloading position, a narrow shelf extending laterally from said conveyor at the unloading position, retractable means for moving each successive container and maintaining it upright while moving off the conveyor onto said shelf with a minor fraction of the bottom of each container supported by said shelf, the remainder of the bottom of the container being unsupported, so that the container will topple off said shelf onto its side when said retractable means is retracted, and means for moving the toppled containers endwise into nested relation.

5. In a mechanism for nesting tapered containers, the combination comprising a conveyor for carrying the containers in upright position, said conveyor having a plurality of three-sided pockets movable successively into an unloading position, a generally vertical wall extending laterally from said conveyor at the unloading position and substantially in alignment with one side of the conveyor pocket in said position, a shelf projecting outwardly from said wall, said shelf having a width such as to support only a minor fraction of the bottom of the container, a pusher finger for moving each successive container laterally out of said conveyor pocket at the unloading position along said wall onto said shelf, said pusher finger having a stop to hold the container in an upright position as it is being moved onto said shelf, means for advancing and then withdrawing said pusher finger to disengage said stop from the container so that the latter topples off said shelf, a pair of downwardly converging wall elements extending generally perpendicularly to said shelf for guiding the toppling container downwardly onto its side, and means for moving the

successively toppled containers endwise into nested relation.

6. In a mechanism for nesting tapered containers, the combination comprising means for moving the containers successively into nested relation to form a stack, a magazine for holding the stack, a pusher for ejecting the stack laterally from said magazine, means on said magazine operable by said pusher for releasing the stack from said magazine, a cam for producing reciprocatory movement, a cam follower on said pusher for following said cam, yieldable means urging said follower to follow said cam, means for retaining said pusher in a retracted position against the urging of said yieldable means, and means for disabling the last mentioned means momentarily to release said pusher for a single cycle of reciprocatory movement.

7. In a mechanism for nesting tapered containers, the combination comprising a magazine for accumulating a stack of nested containers, means for moving the containers endwise into said magazine in nested relation, a pusher for ejecting the stack laterally from said magazine, a cam for effecting reciprocating movement of said pusher, a cam follower on said pusher and associated with said cam, means for continuously operating said cam, a spring urging said cam follower to follow said cam, means for latching said pusher in a retracted position, and means for unlatching said pusher after a predetermined number of containers have been nested in said magazine, said pusher thereby being released for a single cycle of reciprocatory movement under the impetus of said spring and said cam.

8. In a mechanism for nesting tapered containers, the combination comprising a magazine for accumulating the nested containers, said magazine having lower and upper walls provided with flanges for retaining the containers in said magazine against lateral displacement, said upper wall being pivoted for upward movement to release the containers for lateral ejection from said magazine, a reciprocable member for ejecting the containers laterally from said magazine, means on said member to raise said upper wall for releasing the containers, a cam for reciprocating said member, means for continuously operating said cam, a spring urging said member to follow said cam, a latch for latching said member in a withdrawn position, a solenoid for releasing said latch, and a counter for energizing said solenoid momentarily after a predetermined number of containers have been nested in said magazine.

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