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French et al.

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[54] **HANDLING OF THIN WALLED CONTAINERS**

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[73] Assignee: **Schweppes Limited,** St. Albans, England

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Nov. 5, 1971 United Kingdom 51448/71

[52] **U.S. Cl.** ..... **141/172;** 53/187; 53/384; 141/174; 198/131; 214/1 BC

[51] **Int. Cl.** **B65b 43/60**

[58] **Field of Search** ..... 53/187, 384; 141/114, 165, 141/166, 168, 252, 253, 269, 270, 369, 370, 163, 283, 1, 10, 169–175, 177, 275, 281, 282, 312–317, 372; 198/131; 214/1 BC, 8.5 E, 8.5 H, 8.5 K

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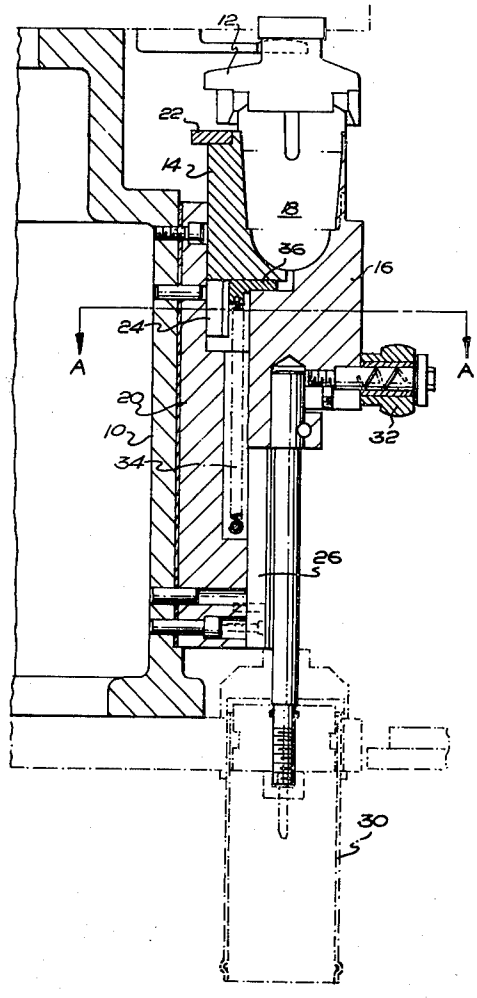
Assistant Examiner—Frederick R. Schmidt
Attorney, Agent, or Firm—Fred Philpitt

[57] **ABSTRACT**

Apparatus for handling thin walled containers including a handling unit comprising a plurality of individual container holders each adapted to hold a container in upright manner therein, means maintaining the holders in spaced relationship and defining an endless path, means for moving the holders in said endless path, each of said holders being split vertically to define two parts which are relatively displaceable vertically from a holder closed position to a holder open position in which a container can be moved horizontally into the upper holder part, and means for relatively displacing vertically the holder parts of each holder from the holder closed position to the holder open position and for returning the parts to the holder closed position.

11 Claims, 9 Drawing Figures



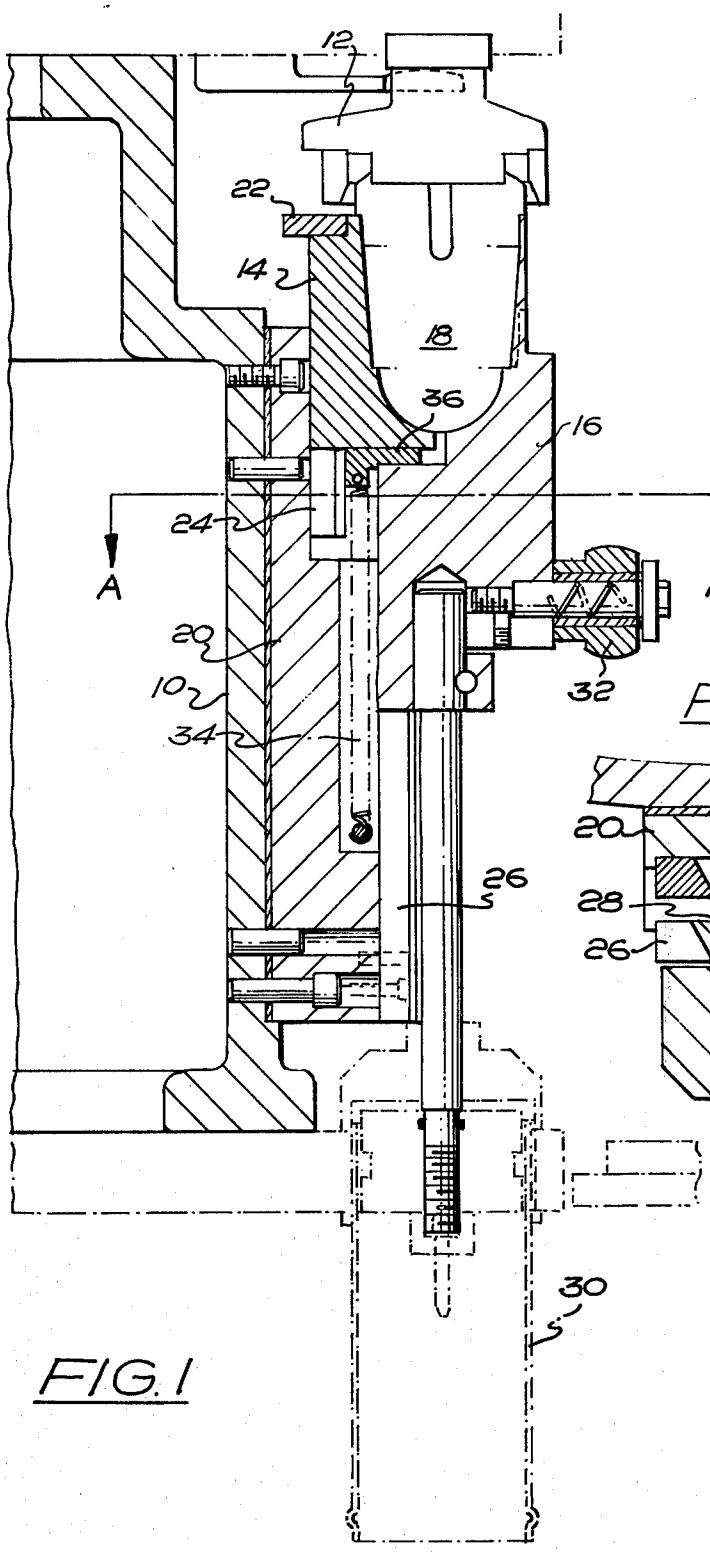


FIG. 1

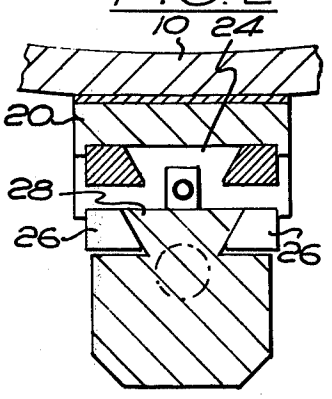


FIG. 2

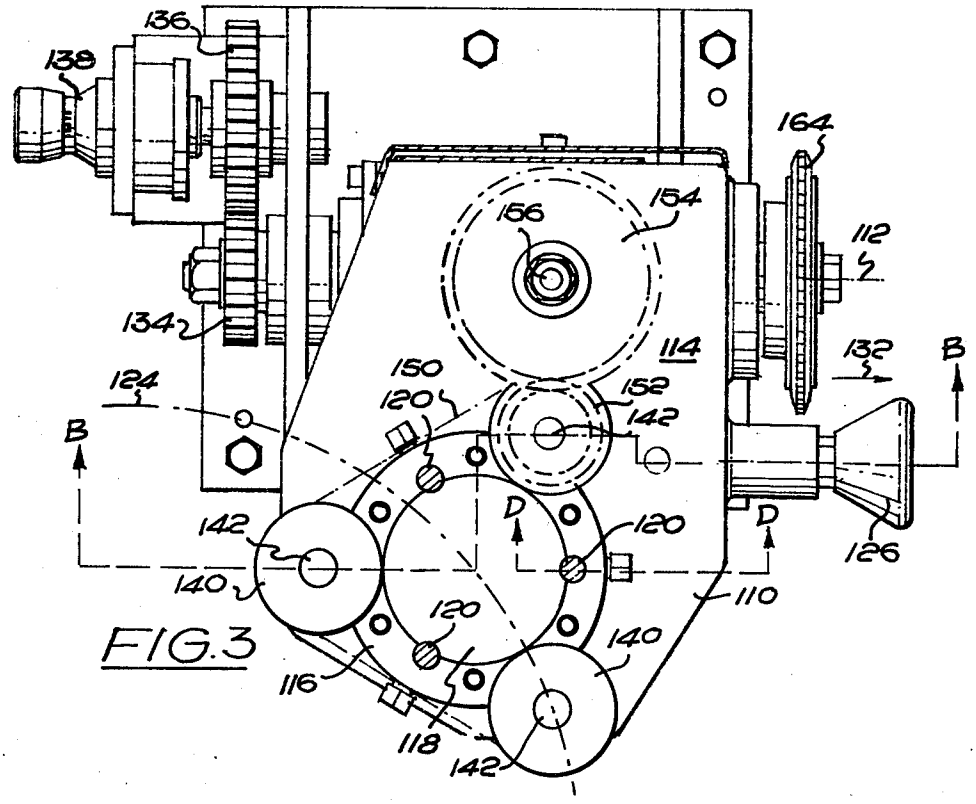
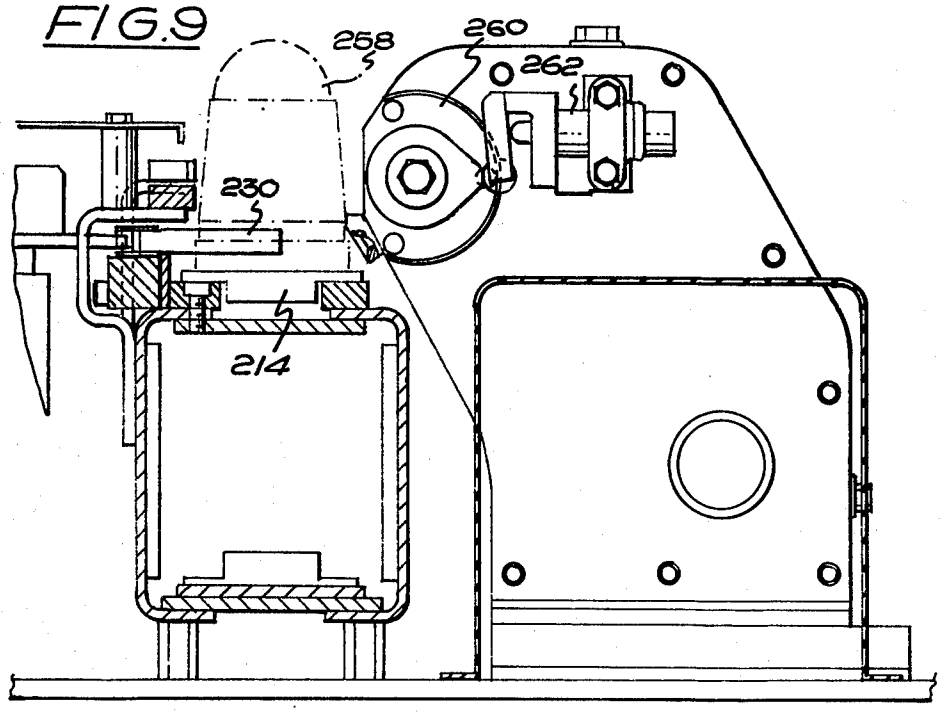

136
138
164
154
156
112
134
114
132
B
124
150
120
152
142
B
D
D
142
120
126
140
110
120
140
116
118
142

FIG.3

FIG.9


258
260
262
230
214

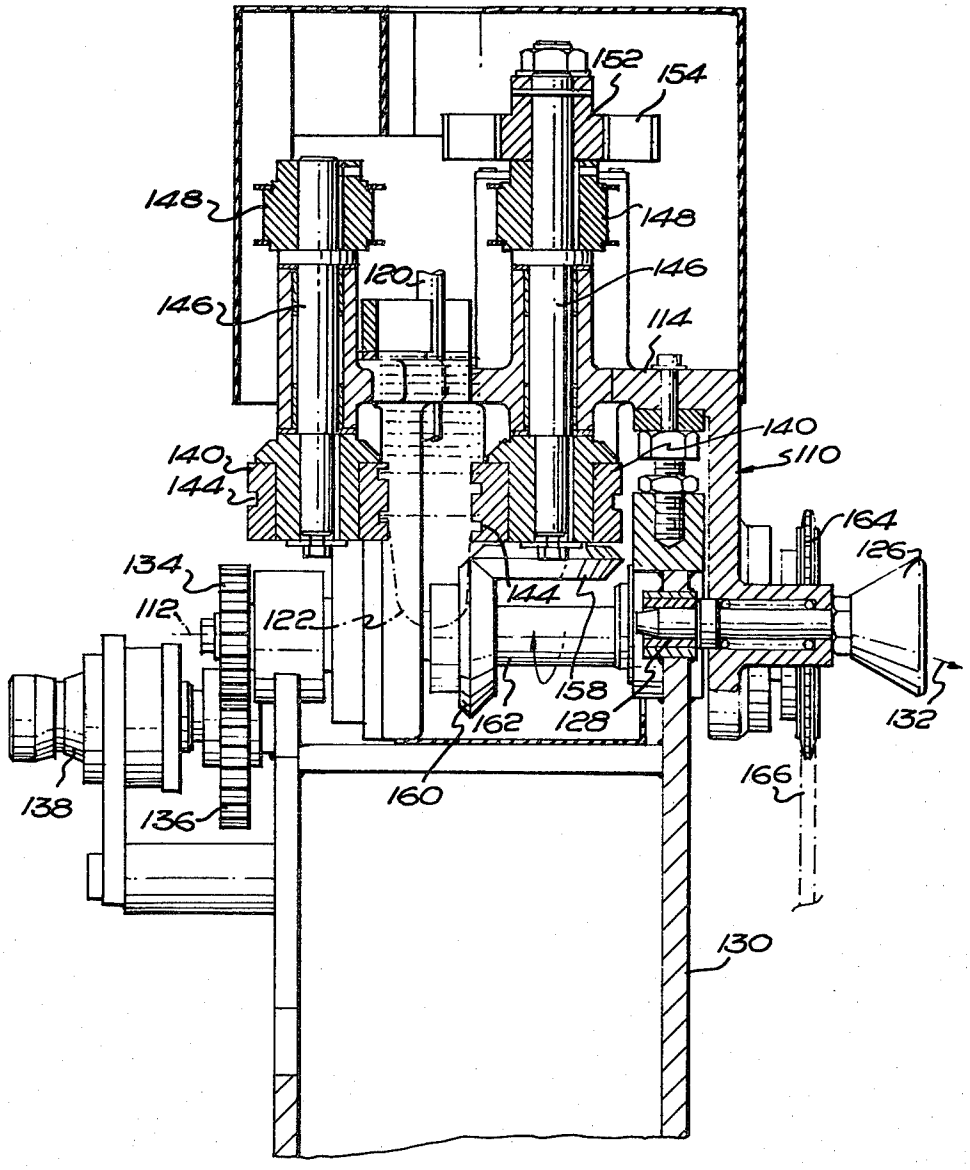

152
154
148
148
120
146
146
114
140
110
140
144
164
126
134
112
122
144
158
162
128
132
138
136
160
166
130

FIG. 4

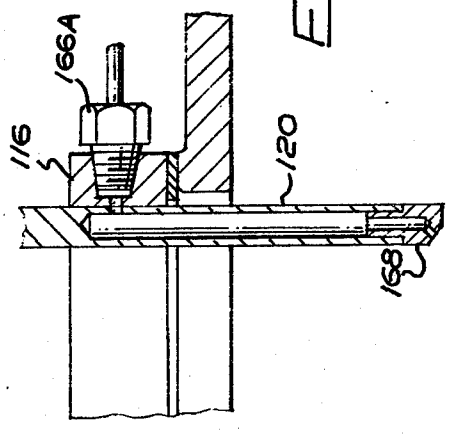

116
166A
120
168

FIG. 5

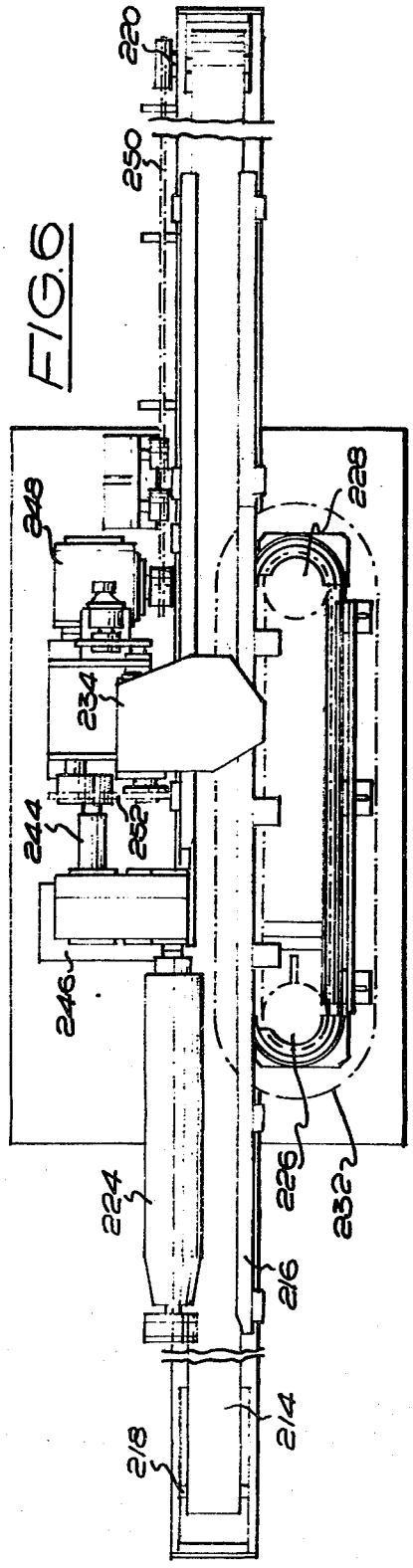

220
250
228
248
234
244
252
246
224
226
232
216
214
218

FIG. 6

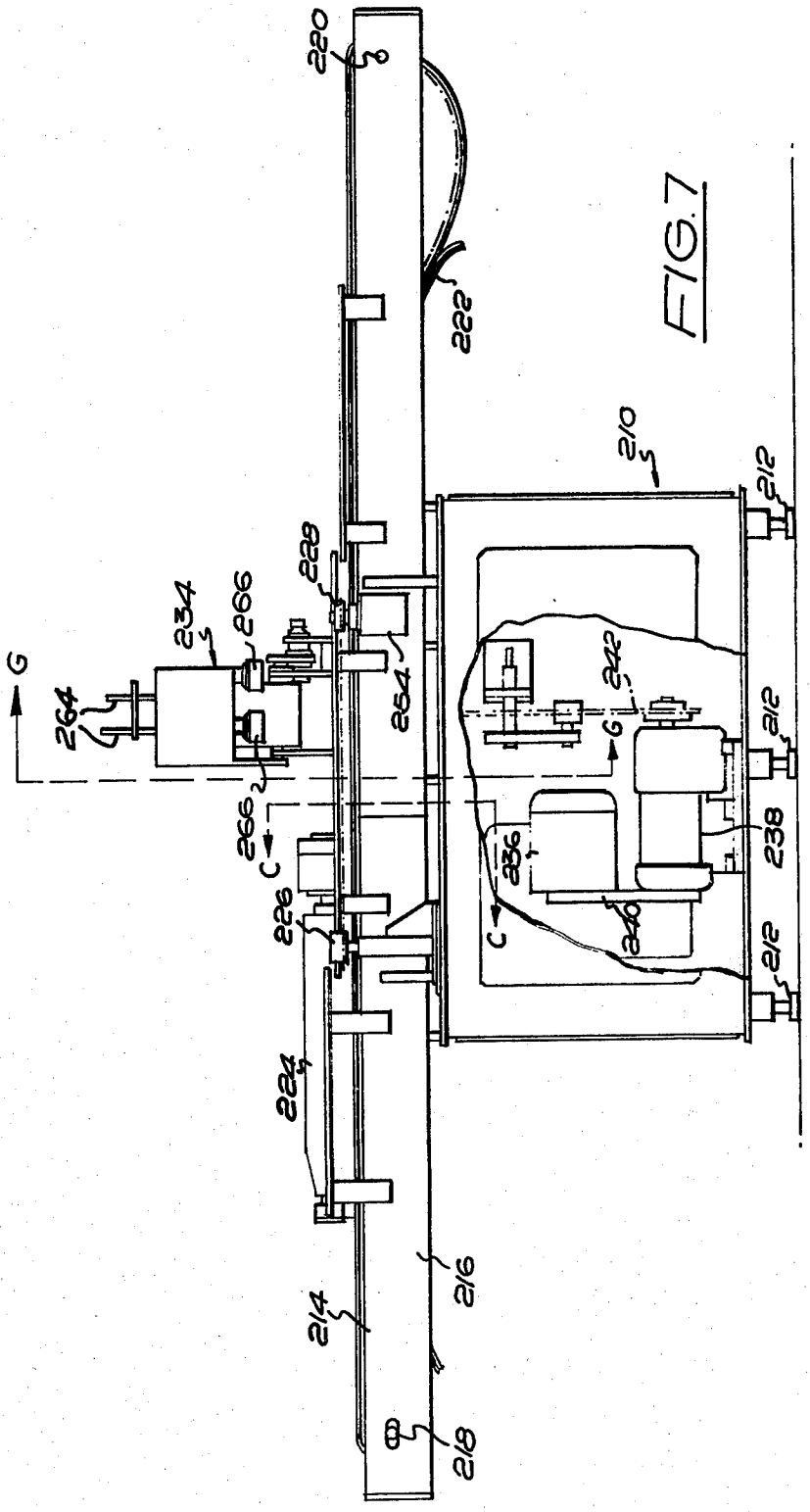

220
222
210
212
228
234
266
264
242
G
236
238
240
226
224
216
214
218

FIG.7

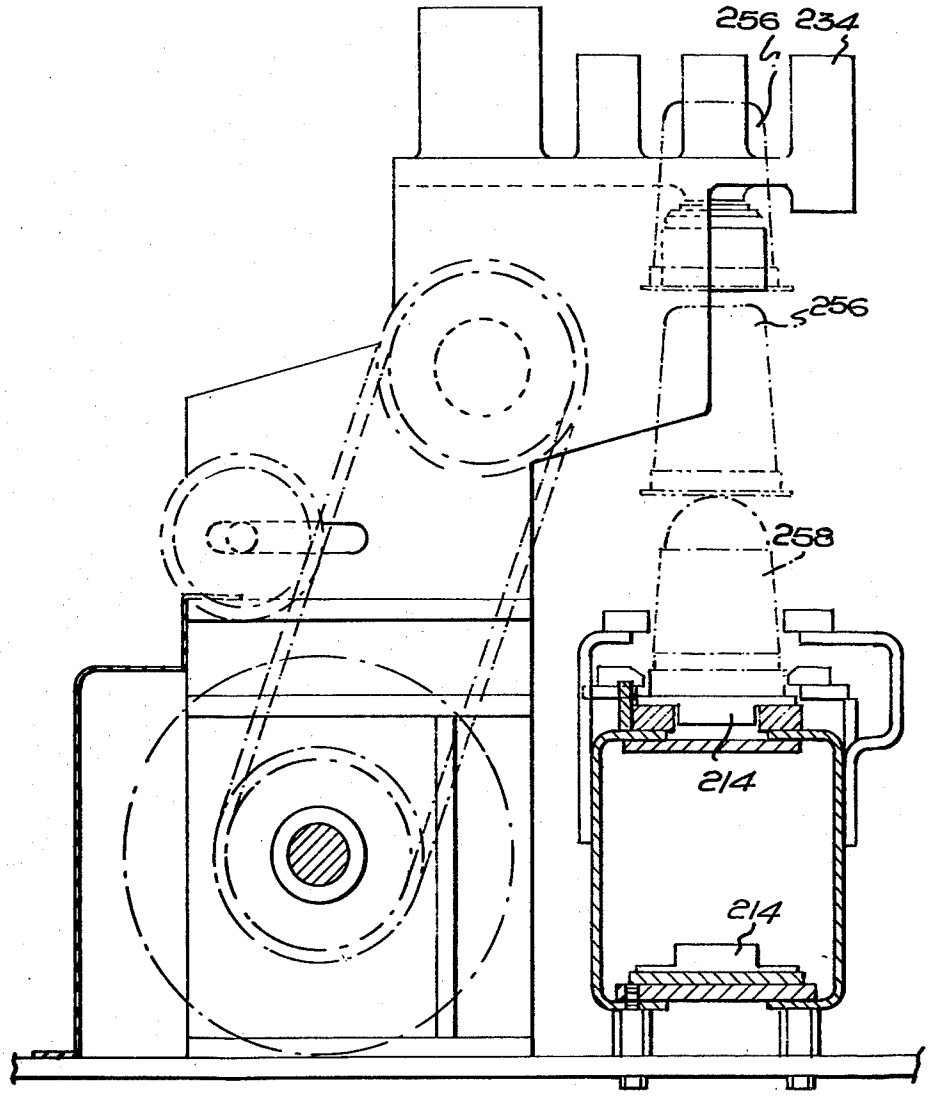


FIG. 8

HANDLING OF THIN WALLED CONTAINERS

The containers themselves may be of any suitable material such as thin plastics material which may be a laminate or thin metal.

A particularly suitable adaptation for the invention is for handling containers which are not free-standing, or which, although capable of free-standing, are of flimsy material such that, for example, during filling they need additional support. Should the need arise, however, the apparatus can be used for handling any thin walled container.

We are not aware of any relevant prior proposals which are sufficiently close to warrant consideration here.

According to the invention, in its broadest aspect, there is provided handling apparatus for handling thin walled containers including a handling unit comprising a plurality of individual container holders each adapted to locate and support a container therein, said holders being adapted to move in an endless path, and each including two or more parts which are capable of movement one relative to the other to open and close the holder, the holders being mounted so that for each holder at least once during a complete cycle of movement along said endless path, the holder is closed to support a container therein, whilst some other operation is carried out in relation thereto and is opened to allow removal and/or insertion of the container.

The said endless path is preferably defined by a pitch circle of a horizontal rotatable table on which the holders are carried.

The holders preferably are each in two shells, an inner shell and an outer shell, in relation to the axis of rotation of said table, the inner and outer shells being capable of relative sliding movement, to a limited extent sufficient to open and close the holder, in a direction parallel to said axis of rotation of the table.

To open the holder, preferably the outer shell is adapted to slide downwards exposing the inner shell and so that a container can be moved into a inner shell in a direction transverse to the axis of the table. In the subsequent closing of the holder, the outer shell slides upwards until it is in horizontal alignment with the inner shell. The holder is preferably open for a sufficient proportion of the circular path of travel to enable one container to be removed in a transverse direction, and another container inserted.

Control of the movement of the outer shell relative to the inner shell may be achieved by means of a cam and follower arrangement. A follower connected to each outer shell engages a common cam track extending circumferentially relative to the table.

In some cases, such as in the filling of containers, it may be desirable that the container, whilst still in the holder should be raised to engage and seal with a filling head to this end each holder may be adapted to be raised whilst in the closed condition and holding a container, relative to the table. In one example, each holder is provided with a raising ram which is actuated to perform this raising of the holder. Operation of each ram is synchronised with the rotation of the table and the filling of the containers.

Of each holder, the shells preferably define identical halves of a cavity shaped neatly to the outer shape of the container to be handled.

The handling apparatus according to the invention preferably further includes a de-stacker for separating containers one by one from the bottom of a stack of nested containers, and empty container feed means for feeding the containers individually and synchronism to said container holders.

Furthermore, the apparatus may include transfer means for transferring containers from the holders to a combining sub-assembly wherein each container is combined with an outer cup. Each container may pass through a washing and drying unit before being passed to the sub-assembly.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawing; wherein

FIG. **1** is a sectional elevation of a holder forming part of the holding unit of the apparatus according to the invention;

FIG. **2** is a sectional plan taken on line A—A of FIG. **1**

FIG. **3** is a plan view of a de-stacker unit of the apparatus according to the invention;

FIG. **4** is a sectional elevation taken on the line B—B of FIG. **3**;

FIG. **5** is a sectional elevation taken on the line D—D of FIG. **3.**

FIG. **6** is a plan view of the combining unit of the apparatus;

FIG. **7** is a side elevation of the apparatus of FIG. **6**;

FIG. **8** is a sectional elevation taken on the line G—G of FIG. **7**; and

FIG. **9** is a sectional elevation taken on the line C—C of FIG. **7.**

Referring firstly to FIGS. **1** and **2,** a part of a rotatable horizontal holder table is shown in the drawings by the reference numeral **10** the table being rotatable about a vertical axis. In this example the containers are to be handled for filling. The section through the table, FIG. **1,** is taken at the peripheral region of the table and shows one container holder in co-operative relationship with a filling head **12** of known construction whereby a container in the holder may be filled, in this case with carbonated beverage. It is to be appreciated that the table **10** has a plurality of holders each as shown in FIG. **1,** these holders being equally spaced around the periphery of the table **10.**

Each holder comprises two shells **14** and **16** which together define a cavity **18** for a container of similar shape, the shells **14** and **16** defining identical halves of cavity **18** when the shells **14** and **16** are in the position shown in FIG. **1** which is the closed position.

The shell **14** is mounted on a block **20** secured to the table **10** so that shell **14** can slide relative to block **20** by the amount from the position shown in FIG. **1** until stop **22** on shell **14** contacts the top face of block **20.** The shell **14** is provided with a dove-tail section which engages in a corresponding slideway **24** (see in particular FIG. **2**) defined in the block **20** to ensure that shell **14** is free only to slide vertically relative to block **20.**

Further slide bars **26** define a slideway for the shell **16** to enable this shell to slide vertically relative to block **20,** but to a greater extent than shell **14** can slide on block **20.** shell **16** has a corresponding dove-tail section **28** (see in particular FIG. **2**) which engages between the bars **26.**

Each holder is associated with a pneumatic ram indicated at **30** which is for raising the holder upwardly so

that the container in cavity **18** engages the filling head **12.** This is the position shown in FIG. **1,** i.e., ram **30** is extended. Ram **30** is connected via its piston rod with the shell **16** and shells **14** and **16** and ram **30** rotate in unison with the rotation of the table **10.**

On the outer side of shell **16,** there is a follower roller **32** which engages a cam track extending circumferentially of the table **10** to ensure that shell **16** moves in the desired manner during each rotation of the table **10.**

Thus, as the table **10** rotates, each of the holder arrangements, as shown in FIG. **1,** operates in a desired sequence of events whereby containers of the configuration which is the same as cavity **18** are loaded into the holders are then filled from the filling head **12** and finally are removed from the holders for further processing.

Considering the sequence of events from the position shown in FIG. **1,** the filling head **12** rotates with the table **10** and filling is completed over a fraction of one complete revolution of the table. It is to be noted that the shells **14** and **16** are designed such that the top edges of the shells locate under a de-nesting ring on the container and by this means push the container into sealing engagement with the filling head. That is to say the body of the container does not take much if any stress due to the pressure with which the upper edge of the container is pressed to the sealing head.

When filling has been completed the pressure in ram **30** is removed and a spring **34** acts to pull down shell **14.** Because shell **14** bears on shell **16** through the spacing and pressure block **36,** in the first stage of movement shells **14** and **16** are lowered together until stop **22** engages the top edge of block **20** when further lowering movement of shell **14** ceases. At this point roller **32** engages the cam track so that further movement of shell **16** in a downwards direction is also prohibited. As the holder continues to rotate with the table, roller **32** eventually engages a section of the cam which is a helical path in relation to the axis of rotation of the table and thereby the shell **16** is moved downwardly until such times as the container in cavity **18** is exposed and can be moved in a radial direction relative to the axis of rotation of the table **10.** Indeed, the container in cavity **18** is removed with its contents and is held upright by suitable guide means. The container is moved into a removing table which rotates in synchronism with the table **10.** The shells **14** and **16** remain in this position until a further empty container is placed in the half cavity defined by shell **14.** This empty container is held in the half cavity defined by shell **14** by suitable guides extending circumferentially of the table until such times as roller **32** engages another section of the cam track which causes shell **16** to lift up to the position in which the complete cavity is defined and the holder is closed. The shells **14** and **16** remain in this position until the ram **30** is actuated at which point the holder is raised as a unit to the sealing head **12** as indicated in FIG. **1.**

The adaptation of the pneumatic ram **30** for raising the holder as a unit up to the sealing head enables a good seal between the container and the sealing head during the filling. This seal is necessary in the case of filling containers with carbonated beverage because if there is any pressure leak then there is a danger that the carbonation balance of the liquid will be destroyed.

It is to be appreciated that this handling unit primarily is for handling containers and in particular is for handling containers which are not free-standing or containers of which the wall is of a very flimsy material and the containers require to be filled under pressure because the adaptation of the cavity to the container outer shape provides that each container is supported against eternal pressure during filling. It is not necessary that these containers be handled in this manner for filling operations. As an alternative where containers have to be lidded then they could be handled by this apparatus and they would be moved up to a lidding head or a seaming head instead of a filling head as indicated in and described with reference to FIGS. **1** and **2** of the drawings.

This handling unit is extremely suitable for handling containers which are not free-standing as clearly would be containers of the configuration of cavity **18.** The arrangement enables the containers to be moved into the shell **14** in a direction transverse and removed similarly to the direction in which the shells **14** and **16** are slid apart. In the overall system ahead of the filling unit described, having regard to the direction of flow of containers, is a destacking unit for dropping one-by-one empty containers from the bottom of a stack of such containers. A feed means in the form of a transfer table which is rotatable about a vertical axis, serves to transfer the empty individual containers from the de-stacker and into the individual shells **14.**

In this connection, reference is made to FIGS. **3** to **5,** which show a suitable de-stacking unit, and such unit includes a housing **110** which is mounted for rotation about the horizontal axis indicated by **112** in FIG. **3.** The housing includes a top plate section **114** which is provided with a boss **116** surrounding an aperture **118.**

Equiangularly spaced around the aperture **118** are three support rods **120** which serve to hold a stack of the containers to be accepted by the unit shown in FIGS. **1** and **2.** The container stack is indicated at **122** in FIG. **4** in position in the de-stacker unit. The rotary transfer table passes under the aperture **118** and the bottom of stack **122,** and this transfer table is provided at equal intervals on the pitch circle indicated by **124** in FIG. **3** with a plurality of individual container receiving cavities the arrangement being that the stack of containers is placed between the guides **120** and the containers pass through the aperture **118** as they are de-nested individually from the bottom of the stack and the individual containers are positioned in the holders travelling on pitch circle **124.** Pitch circle **124** lies in a horizontal plane and has its center at the axis of rotation of the transfer table.

The plate **110** and the components carried thereby are not normally moved during the de-stacking operation, a spring loaded plunger **126** serving to hold the plate **110** in position by locating in a bore **128** in a stationary framework work **130** on which the plate **110** is mounted. Should it be desired to swing the plate **110** and the components carried thereby clear of the table having the cavities on pitch circle **124,** then plunger **126** is pulled manually as indicated by arrow **132** in FIG. **4** thereby releasing same from the bore **128** and the plate **110** and the components carried thereby can be swung about axis **112** and clear of the transfer table. This is useful in cases where it may be desired to clear a blockage of containers **122.**

In swinging the plate **110** from the in use position shown to the out of use position described, a gear **134** rotates another gear **136** with which it meshes and gear **136** is in turn drivingly connected to a rotary damper

unit 138 to retard the acceleration of the plate 110 between the in use and out of use positions.

The plate 110 includes means for imparting to the bottom container in the stack an initial separation from the remainder of the stack and also means whereby jets of air can blow the partially separated container away from the remainder of the stack and quickly into the receiving cavity which is passing underneath at the given time. The initial mechanical separation is achieved by three rotors 140 which are equiangularly spaced around the aperture 118. The rotors 140 are mounted for rotation about vertical parallel axes 142 and each roller is positioned so that its periphery will have tangential overlap with a flange on each container 122. EAch rotor 140 thus has a helical groove 144 therein and it is in this groove in each rotor which the flange of each container locates as it is separated from the bottom of the stack. The rotors 140 are drivingly connected to vertical shafts 146 and gears 148 connected to the top ends of shafts 146 are drivingly interconnected by means of an endless band of toothed timing belt 150 to ensure that the rotors 140 rotate at exactly the same speed and in relation to their helical grooves 144 are exactly in phase.

One of the shafts 146 carries on a portion which extends above the gear 148, a further gear 152 which meshes with a drive pinion 154 which is carried by a vertical shaft 156 which extends through and is rotatably mounted on the plate 110. At the lower end of shaft 156, there is a bevel gear 158 and this meshes with a further bevel gear 160 carried by the shaft 162 which lies at right angles to the shaft 156 and which also defines the said axis 112. At the right hand end of shaft 162 there is a drive sprocket 164 around which is trained a drive chain 166 which receives power from a sprocket carried on the drive shaft coupled to the transfer table having the container cavities on pitch circle 124.

This ensures that the mechanical drive means for giving an initial separation to the containers 122 is driven in synchronism with the transfer table to ensure the accurate dropping of the containers 122 into the cavities on pitch circle 124.

In addition to the mechanical separation of the bottom container from the remainder of the stack, there is also a pneumatic separation of the said container 122. This pneumatic separation is achieved by providing that the lower ends of the rods 120 are hollow (see FIG. 5) and where they are located in flange 116, each rod 120 communicates with an inlet 166A which enables a supply of air under pressure to travel through the inlet 166A and into the interior of rod 120. At its extreme lower end each rod is provided with a nozzle 168 from which a jet of air can issue in a downwards and inwards direction, considering the stack of containers 122 as being located vertically and within the space defined by the rods 120.

Thus, by virtue of the fact that there are three rods 120 then there are three jets of air which to blow the partially separated container away from the remainder of the stack quickly and into the passing cavity in the transfer table 124. By virtue of blowing the container away from the remainder of the stack this ensures that there is a minimum of time delay between the separation of the container from the stack and its placement in the cavity which is travelling in a transverse direction underneath the stack. Because there is the minimum of time delay in placement of each container in the travelling cavity, then the cavity can travel on pitch circle 124 in a continuous motion and this leads to a simplification of the driving mechanism for the table. In an alternative arrangement, instead of a rotary transfer table there may be a continuous endless conveyor which carries means defining the cavities and in this case, the cavities would travel not on an arcuate path as indicated by circle 124 but in a straight path underneath the bottom of the stack.

Briefly the operation of the de-stacker unit illustrated and described is as follows. Drive is transmitted through a chain 166 to sprocket 164 and in turn this causes rotation through gear 160 and 158 of gear 154. Gear 154 drives gear 152 and in turn the three rotors 140 are rotated. With a stack of containers 122 in the holder as shown in FIG. 4 then the bottom container is separated initially as shown by engagement of the container flange with the helical grooves 144 of rotors 140 and then at the correct instant in time, the jets of air are issued from nozzle 168 propelling the container away from the remainder of the stack and into the cavity travelling transversely under the stack of containers. The synchronising of the application of the air jets is achieved by providing a cam (not shown) in the drive between the table and the mechanical separation means and this cam actuates a follower at the correct frequency and actuation of the follower causes the application momentarily of an air jet from each of nozzles 168.

It will be appreciated that the de-stacker unit can be used with containers of different forms. In the example described we have illustrated a container which is generally tapered in shape and has as a top peripheral flange and a hemispherical base.

When the filled containers are removed from the handling unit of FIGS. 1 and 2, preferably they are transferred to a lidding unit whereat they are sealed by a conventional sealing and lidding process, again synchronised with the de-stacking and filling unit.

After being sealed, the containers are preferably transported to a washing and/or drying unit and finally, after being inverted, to a combining unit as illustrated in FIGS. 6 to 9 whereat each container is combined with a drinking cup to provide a complete package.

Referring to FIGS. 6 to 9, in FIGS. 6 and 7 the general layout of the combiner unit for the containers and cup is shown. The containers will be referred to as inner containers because, the cups are dropped over same. By the same rule, the cups will be referred to as "outer cups." In FIGS. 6 and 7, it will be seen that the apparatus includes a lower housing 210 which stands on feet 212 and on top of the housing is mounted an endless conveyor band 214 which may be of flexible web material or may be of a pivotally interconnected slat type conveyor. The conveyor belt 214 travels round pulleys respectively at the ends of a support frame 216 for the conveyor belt and the axes of rotation 218 and 220 of the pulleys are shown. The pulley of which the axis of rotation is represented by numeral 220, is driven from the drive mechanism of the apparatus in general whilst the pulley of which the axis of rotation is represented by numeral 218 is an idler pulley, but is capable of adjustment in the direction of the length of the conveyor belt to take up any slack therein. The upper reach of the conveyor is the working reach, i.e., it carries the inverted inner containers whilst the

lower reach returns along a guide **222** located under the upper reach.

Considering FIGS. **6** and **7** the inner containers travel on the conveyor **214** from left to right and the left hand end of the conveyor belt **214** is supplied with inverted inner containers which have been filled with carbonated beverage as explained with reference to FIGS. **1** and **2** and sealed by means of an sealing unit. The inner containers are supplied by an auxiliary conveyor which lies alongside conveyor **214** and slightly overlaps same. The inverted inner containers first meet a screw feeder **224** which lies alongside the conveyor belt **214** and slightly above same so that the conveyor **224** can receive, feed and space the inner containers at regular intervals. To this end screw conveyor **224** is provided with a tapered left hand end. As the screw conveyor **224** rotates, it engages between each pair of adjacent flights one of the inverted inner containers and from this point there is a positive control on the position of that inner container. Along the length of screw conveyor **224** therefore the inner containers become regularly spaced and prior to the point where the inner containers leave screw conveyor **224,** they are engaged by flights on an endless alongside which is disposed in a horizontal plane and is guided round pulleys **226, 228.** This endless chain is located alaongside and slightly above the conveyor belt **214** as indicated in FIGS. **6** and **7** and the flights **230** (see FIG. **9**) extend radially outwards from the chain and the tips of the flights have a path of travel as indicated by **232** in FIG. **6.** The flights **230** are regularly spaced so that each engages an inner container on belt **214** and pushes same past an outer cup dropping head indicated in FIGS. **6** and **7** by reference numeral **234** from which inverted outer cups are dropped one by one from a stack contained in the head **234,** so that each inverted inner container receives an inverted outer cup and composite packages made up of an inner container and an outer cup are fed from and to the right of head **234** in FIGS. **6** and **7.**

The head **234** operates substantially the same as the de-stacker illustrated in FIGS. **3** to **5** and therefore no further description is given here. The head **234** also has the facility of being pivoted clear of the conveyor **214** for maintenance and for the clearance of blockages.

The drive mechanism for the apparatus illustrated derives from an electric motor **236** contained in housing **210.** Electric motor **236** drives a gear box **238** through an endless belt **240** and the output from gear box **238** drives through a chain and sprocket mechanism **242,** a horizontal drive shaft **244** (FIG. **6**) which in turn drives through gearbox **246** the screw conveyor **244** and also drives through bevel gearing **248** a chain and sprocket arrangement **250** which in turn drives the drive pulley for conveyor belt **214.**

The drive for the cup dropping head **234** is taken from shaft **244** through an endless chain **252** so that the motions of the driven parts of the combiner unit are synchronised with each other, and also with the other units of the apparatus and are adapted for continuous operation. Inner containers are therefore fed continuously past the head **234** at regular intervals as defined by the flights **230** and in synchronism with this movement the outer cups are dropped one by one so that the composite packages are delivered at the end of conveyor **214.** The drive from gear box **238** also drives the endless chain having the flights **230** via a further bevel gear box **254.**

FIG. **8** shows how an outer cup **256** is dropped from the dropping head **234** onto an inverted inner container **258.** It is to be noted that the inner container is of the shape already illustrated in previous figures. The outer cup is of the same generally inverted frusto-conical shape, but has a flat base. The inner container and outer cup are of course self-aligning by being of frusto-conical shape as the cup **256** drops over container **258,** and moreover this shape allows for a margin of error in the registration of inner container and outer cup **256** as the latter falls, due to the fact that the largest diameter of the cup is meeting the smallest diameter of the container in falling over the container.

FIG. **9** illustates, as mentioned previously, the operative relationship of flights **230** and inner containers **258.** It will be noticed that the flights **230** extend so as to over-lap the inner containers **258** by more than half the width of the containers. This ensures that there is no tendency for the containers **258** to jam in the flights **230.** The flights **230** are in fact driven at a slightly lower speed than that of conveyor **214** to ensure that the flights remain in firm contact with the containers engaged thereby and this ensures the accurate spacing of the containers **258** as they pass under head **234.**

FIG. **9** also illustrates a cam **260** which is driven by the drive mechanism of the apparatus. This cam is arranged to actuate a valve **262** once per revolution of the cam and the actuation of valve **262** results in the application of air jets to each outer cup after it has been separated from the bottom of the stack of outer cups and is in a position to fall onto an inverted container **258** located thereunder. This ensures that the cup accelerates away from the remainder of the stack and there is the minimum of delay between the separation of the container and its reaching a position wherein it overlies the container **258.** The air-jet nozzles are located at the ends of the upright guides **264** illustrated in FIG. **7.** These guides also serve to hold the stack of inverted cups in position in the cup dropping head **234.** FIG. **7** also shows the rotors **266** which are driven continuously with the continuous operation of the apparatus and which impart an initial separation to the bottom cup of the stack prior to such cup being accelerated away from the remainder of the stack and in a downwards direction by the air-jets as aforesaid.

What is claimed is:

1, Handling apparatus for handling thin walled containers including a handling unit comprising a plurality of individual container holders each adapted to hold a container in upright manner therein, means maintaining the holders in spaced relationship and defining an endless path, means for moving the holders in said endless path, each of said of being split vertically to define two parts which are relatively displaceable vertically from a holder closed position to a holder open position in which one of said holder parts becomes an upper holder part and the other of said parts becomes a lower holder part so that a container can be moved horizontally into the upper holder part by a container moving means, and means for relatively displacing vertically the holder parts of each holder from the holder closed position to the holder open position and for returning the parts to the holder closed position.

2, Apparatus according to claim **1** wherein (said endless path is circular and is disposed horizontally), the means maintaining the holders in spaced relationship and defining said endless path comprises a circular

holder table, the apparatus including means for rotating the table about a vertical axis passing through the center of the table.

3. Apparatus according to claim 2 wherein the holder parts of each holder define a cavity of the profile of the container to be held by the holder.

4. Apparatus according to claim 3 wherein each holder is split centrally so that each part defines half of said cavity, the split lying tangentially to the table periphery so that the parts are inner and outer relative to said path.

5. Apparatus according to claim 4 wherein of each holder the outer part is adapted to slide vertically downwards exposing the half cavity of the inner part.

6. Apparatus according to claim 5 wherein the means for relatively displacing vertically the holder parts includes a cam track surrounding the table, and a cam follower which is connected to the outer holder part and which engages the cam track during one revolution of the table to move the outer part of each holder between the closed and open positions.

7. Apparatus according to claim 6, including a plurality of filling heads adapted to fill the containers one-by-one as they are held in said holders, said filling heads being mounted for rotation with said holder table, and each having a filling nozzle in vertical register with each holder, and is adapted to fill a container held in a holder when said container is raised against the appropriate filling nozzle by said raising means.

8. Apparatus for de-stacking and handling thin-walled containers comprising a de-stacking unit adapted to hold a stack of containers and separate same one-by-one from the bottom of the stack of containers, trandfer means having means defining spaced cavities each adapted to hold a container, means drivingly connected to said transfer means for moving the means defining the cavities so that the cavities move between the de-stacker unit and a filling unit, said filling unit comprising a plurality of individual container holders each adapted to hold a container in upright manner therein, means maintaining the holders in spaced relationship and defining an endless path, means for moving said holders in said endless path, each of said holders being split vertically to define two parts which are relatively displaceable vertically from a holder closed position, to a holder open position in which one of said holder parts becomes an upper holder part and the other of said holder parts becomes a lower holder part so that a container can be moved horizontally from the transfer means into the upper holder part, means for relatively displacing vertically the holder parts of each holder from the holder closed position to the holder open position and for returning the parts to the holder closed position.

9. Apparatus according to claim 8 wherein said de-stacking unit comprises a magazine for the stack of containers, a plurality of rotors disposed around the stack, means for rotating the rotors in synchronism, the rotors being so positioned and having helical grooves which engage top flanges of the containers in the stack in turn, to impart to each bottom container, an initial separation from the remainder of the stack, and air-jet applying means operative to blow the partially de-nested bottom container away from the remainder of the stack and into a cavity of the transfer means, said rotors, air-jet applying means and transfer means being interconnected by connection means for operation in synchronism to ensure the blowing of a container into a cavity of the transfer means as it passes under said stack.

10. Apparatus according to claim 9 wherein the transfer means comprises a horizontally disposed transfer table and means for rotating the transfer table about a vertical axis, said cavities being located equiangularly spaced on the table on a pitch circle having its center on the axis of rotation of the transfer table and including gear means connecting the rotors and the table in that the table revolves simultaneously with the rotors.

11. Apparatus according to claim 10 wherein the means connecting the air-jet means with the transfer table and rotors, comprises a cam connected to the transfer table and a cam follower positioned to be operated by the cam connected to the transfer table, said cam follower being connected to valve means operatively controlling said air-jet means.

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