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Complete Specification entitled (64) IMPROVEMENTS RELATING TO THE HANDLING OF THIN WALLED CONTAINERS

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Applicant (71) SCHWEPPES LIMITED

Actual Inventor (72) JOHN ANTHONY FRENCH and JOHN COLIN TURNER

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The following statement is a full description of this invention, including the best method of performing it known to us:

11746/75-L X769-72-6D-19P.C. F. D. Atkinson, Government Printer, Canberra
This invention relates to the handling of thin walled containers, and in particular relates to handling apparatus for receiving, holding and then releasing the containers as some other operation is carried out in relation thereto. Such operation may be, for example, the filling of the containers or the lidding of the 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 hold and a container in an upright manner therein, said holders being adapted to move in an endless path, and each being split vertically to define two parts which are relatively displaceable vertically from a holder closed position to a holder open position in which the container can be moved horizontally into the upper part, 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 held in the closed position to support a container therein, whilst some other operation is carried out in relation to the container and the holder is moved to the open position to allow removal and/or 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 circumference-
tially 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 table is shown in the drawings by reference numeral 10. 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 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, 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 relative to block 20.

Further slide bars 26 define a slideway for the shell 16 to enable this shell to slide 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 removed in a radial direction relative to 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. In this empty container is held 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 container requires to be filled under pressure because the adaptation of the cavity to the container outer shape provides that the container is supported against external 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 transverse direction and removed similarly. In the overall system ahead of the filling unit described, having regard to the direction of flow of containers, is a de-stacking unit for dropping one-by-one empty containers from a stack of such containers. A feed means in the form of a feed wheel 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. A rotary table passes under the aperture 118 and this table carries at equal intervals on the pitch circle indicated by 124 in Fig. 3 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.

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 carrying the cup holders 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 rotary 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 exceleration 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 rotary table carrying 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 table carrying the containers holders to ensure the accurate dropping of the containers 122 into the cavities in table 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 166 which enables a supply of air under pressure to travel through the inlet 166 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 on the 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 table there may be a continuous endless conveyor which carries 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 122 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 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 the 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 a 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 belt 214 and slightly above same so that the conveyor 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 ad-
jacent 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 chain which is disposed in a horizontal plane and is guided round pulleys 226, 228. This endless chain is located alongside 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 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 destacker illustrated in fig. 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 224 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 248 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 other cup is of the same generally inverted fruste-conical shape, but has a flat base. The inner container and outer cup are of course self-aligning by being of thin frusto-conical shape as the container 256 drops over cup 258, and moreover this shape allow 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 illustrates, 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 there-under. 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. 6 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.
The claims defining the invention are as follows:—

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 an upright manner therein, said holders being adapted to move in an endless path, and each being split vertically to define two parts which are relatively displaceable vertically from a holder closed to a holder to open position in which a container can be moved horizontally into the upper part, the holders being mounted so that for each holder at least once during a complete cycle of movement along said endless path, the holder held in the closed position to support a container therein, whilst some other operation is carried out in relation to the container and the holder is moved to the open position to allow removal of the container.

2. Apparatus according to claim 1, wherein said endless path is defined by a pitch circle of a horizontal rotatable table on which the holders are carried.

3. Apparatus according to claim 2, wherein the holder parts are defined by 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.

4. Apparatus according to claim 3, wherein, of each holder the outer shell is adapted to slide downwards exposing the inner shell and so that a container can be moved into the
inner shell in a direction transverse to the axis of the table.

5. Apparatus according to claim 4, wherein of each holder, the outer shell is mounted to slide upwards over a pre-set angle of rotation of the table, until it is in horizontal alignment with the inner shell.

6. Apparatus according to claim 4 or 5, wherein there is a cam and follower connection between each shell and a stationary guide means surrounding the table to ensure that each outer shell is raised and lowered at least once per revolution of the table.

7. Apparatus according to claim 4, 5 or 6, where each holder has connected thereto a raising means which moves therewith as the table rotates and is adapted to raise the holder independently of the table when the outer shell in horizontal alignment with the inner shell.

8. Apparatus according to claim 7, including a filling head adapted to fill the container one-by-one as they are held in said holders, the arrangement being that the filling head rotates with said table, has a filling nozzle in vertical register with each holder, and fills a container when it is raised against the appropriate filling nozzle by said raising means.

9. Apparatus according to any preceding claim including a de-stacking unit for de-stacking containers which are subsequently fed to the handling unit.

10. Apparatus according to claim 9, wherein said destacking unit comprising a magazine for the stack of containers, a driven mechanical means for imparting to the bottom container
an initial separation from the remainder of the stack, air
jet applying means operative to blow the partially de-nest-
ed bottom container away from the remainder of the stack, and
a plurality of individual container receiving means adapted
to be moved continuously in an endless path which passes
underneath the bottom of the stack of containers, said dri-
ven mechanical means air jet applying means and container
receiving means being interconnected for operation in syn-
chronism to ensure the blowing of a container into each re-
ceiving means as it passes under said stack.

11. Apparatus according to claim 10, wherein the driven
mechanical means comprises a plurality of rotors disposed
around the stack and interconnected to be rotated in synchro-
nism, the rotors being so positioned and having helical groo-
ves which engage top flanges of the containers in the stack
in turn, to impart to each bottom container, the said initial
separation.

12. Apparatus according to claim 11, wherein the container
receiving means are carried by a rotatable table and are lo-
cated on a pitch circle thereof at equal angular intervals,
the table is geared to the driven mechanical means so as to
revolve simultaneously with the operation of the driven mecha-
nical means, the table and driven mechanical means being
adapted for continuous rotation and operation.

13. Apparatus according to claim 12, wherein the air jet
means is synchronised with the table and driven mechanical
means by the provision of a cam which rotates with the table
and operates, at the desired instant in time and frequency,
a cam follower, operation of which results in the application
air jet(s) to the partially separated container.

14. Apparatus according to any preceding claim, including a combiner unit adapted to combine outer cups individually with containers which have previously been handled by the handling unit.

15. Apparatus according to claim 14, wherein the combiner unit comprises conveying means for conveying inverted containers in a queue past a head from which the outer cups in inverted disposition are dropped, means for spacing the containers at regular intervals, and means drivingly interconnecting the head and conveyor means so that an inverted cup is dropped onto each inverted container as it passes the head.

16. Apparatus according to claim 14, wherein the means for spacing the container at regular intervals comprises a feed screw and an endless band or chain having regularly spaced flights thereon which pass under the head and each of which engages an inner inverted container as it passes under the said head.

17. Apparatus according to claim 15 or 16, wherein the head comprises a magazine for holding a stack of nested inverted cups, a driven mechanical means for imparting to the bottom cup an initial separation from the remainder of the stack, and air jet applying means operative to blow the partially de- nested bottom cup away from the remainder of the stack, said driven mechanical means, air jet means and conveying means being connected for operation in synchronism to ensure the dropping of the cups onto the individual containers as they pass under said head.

18. Handling apparatus for handling thin walled containers
substantially according to the embodiment described in the specification with reference to and as illustrated in the accompanying drawings.

DATED this 2nd day of NOVEMBER, 1972
SCHWEPPES LIMITED

By its Patent Attorneys,
R.K. MADDERN & ASSOCIATES.