

April 29, 1969

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3,440,794

APPARATUS FOR AND METHOD OF PACKAGING LIQUID

Filed Sept. 13, 1966

Sheet 1 of 4

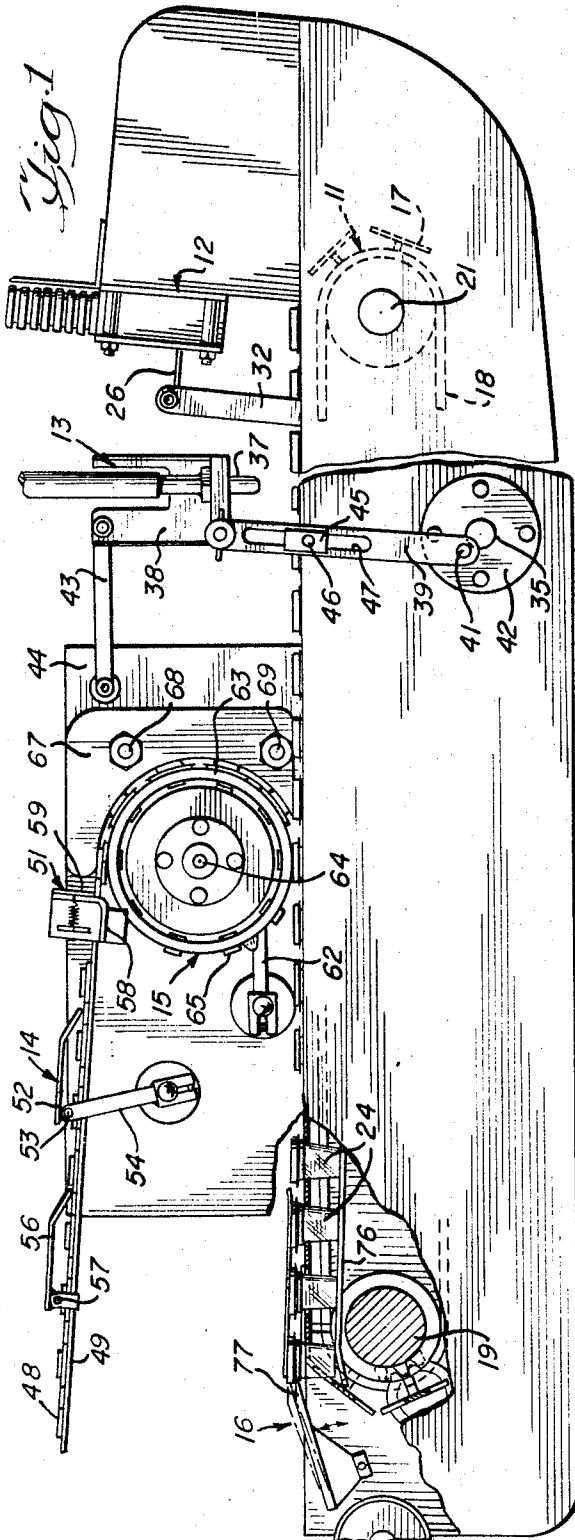
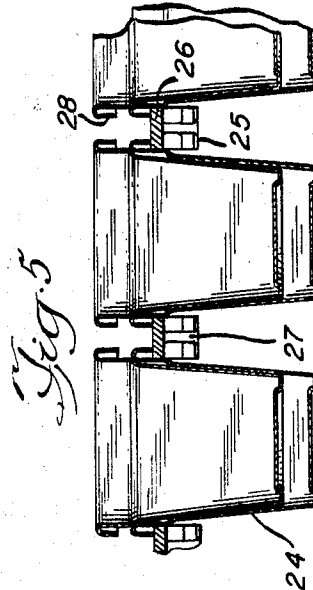
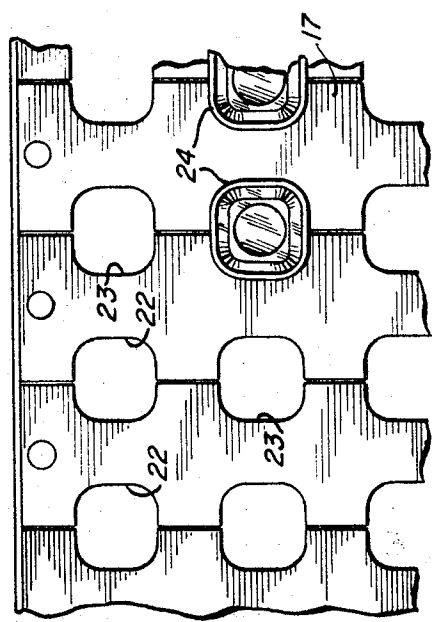


Fig. 6

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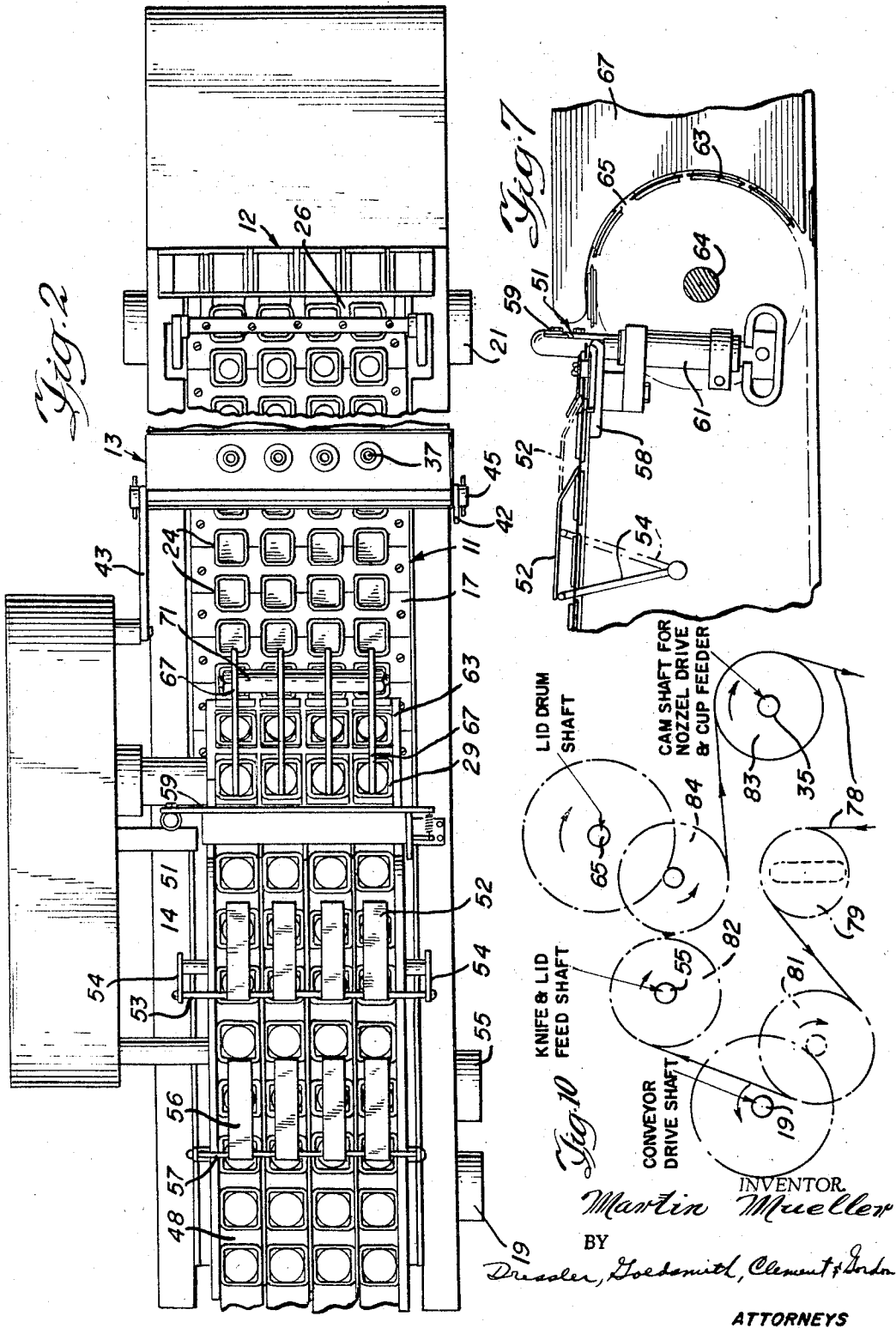
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Sheet 2 of 4



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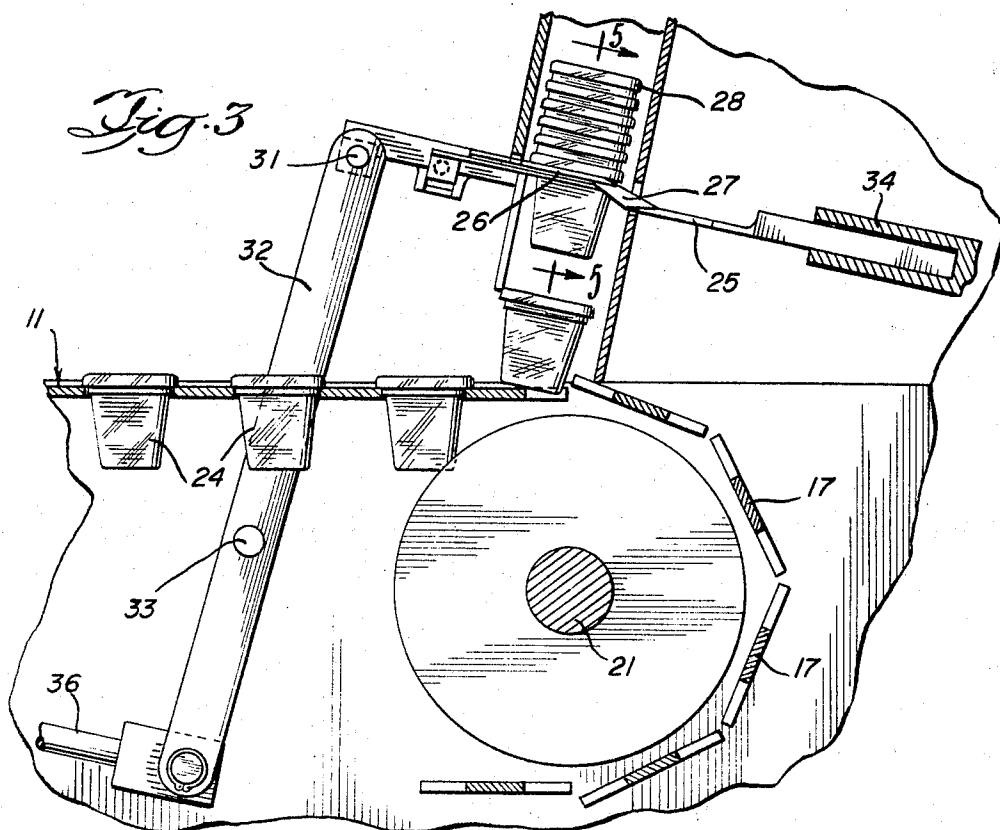
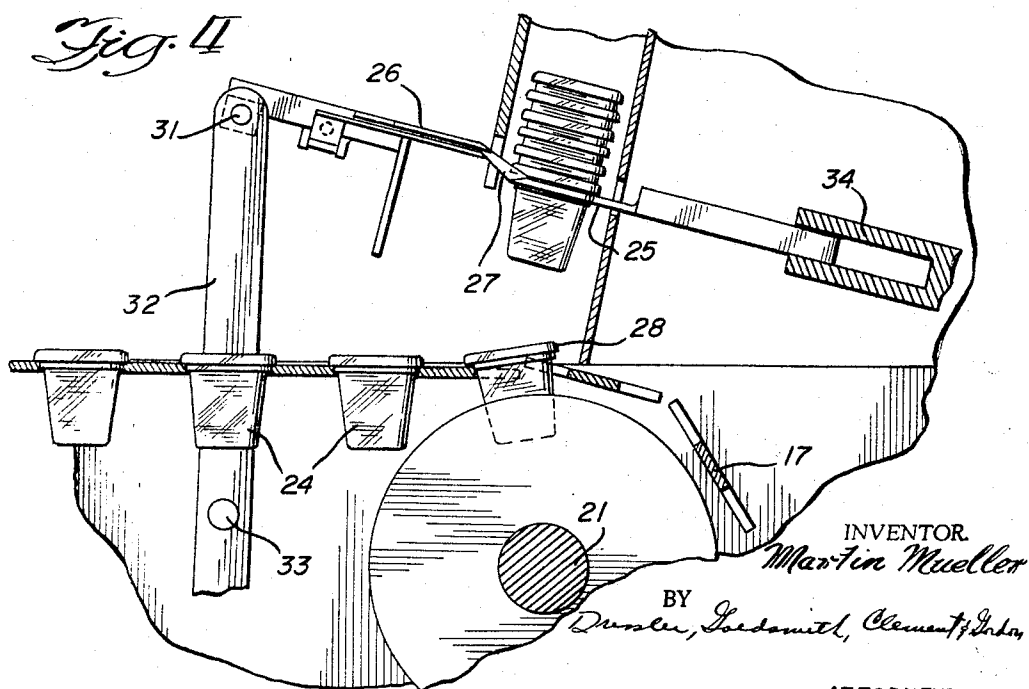
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Sheet 3 of 4



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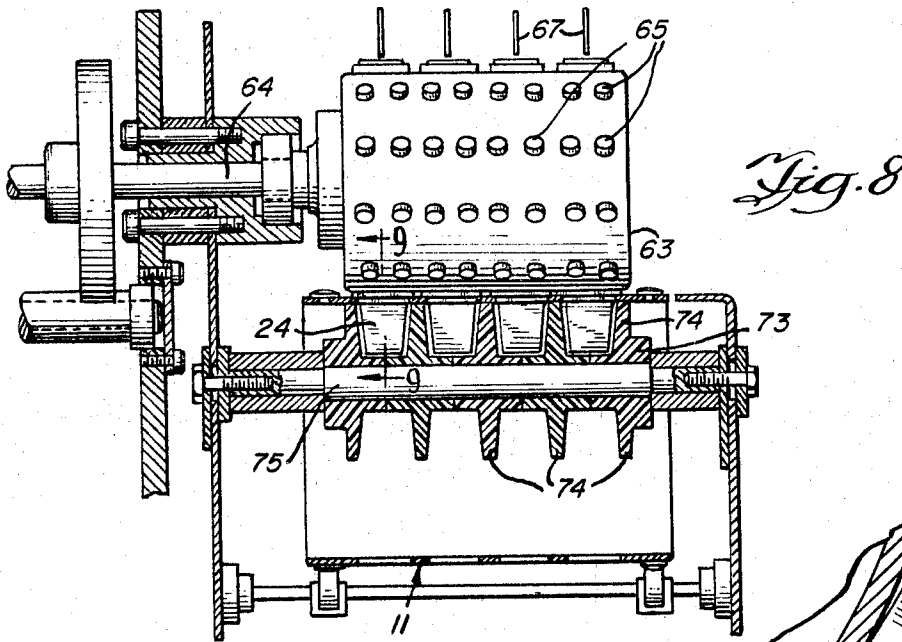
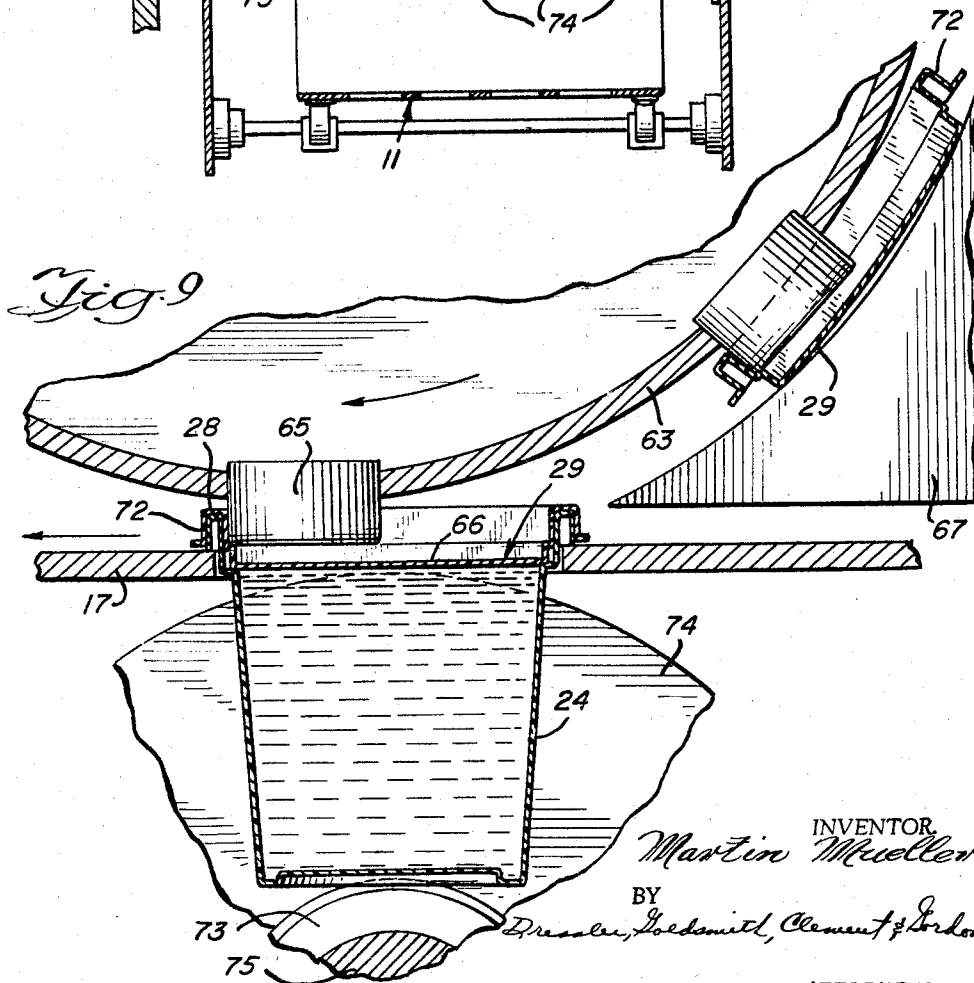
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Sheet 4 of 4



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APPARATUS FOR AND METHOD OF PACKAGING LIQUID

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14 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for packaging liquid in containers including a dispensing magazine for gravity feeding individual containers in a transverse row into a continuously moving conveyor, means for simultaneously filling each container in a row during movement of the conveyor, and means for simultaneously applying individual covers to each of the filled containers in a row.

This invention relates to the packaging of liquid, and is particularly concerned with the production of inexpensive individual packages of liquid that may be packaged and shipped conveniently without danger of breakage or spillage.

The invention was made with particular reference to the packaging of individual servings of cream, milk, or similar liquids, for restaurant use and will be described with reference to such use, but it will be understood that the advantages of the invention may be utilized in the packaging of many different liquids or other flowable material in containers of any suitable size.

It has been customary heretofore to package individual servings of cream or milk in small glass bottles to which disk closures are applied. The bottles are subject to breakage and require extensive handling, thus adding to the expense of the serving. In addition, the bottles require sterilization before each use and are often refilled by restaurant employees under unsanitary conditions.

In accordance with the present invention, individual servings of cream or milk are packaged in plastic or paper containers in sanitary condition in a fast, inexpensive, continuous process with a minimum of handling and without any danger of breakage.

The apparatus for packaging the cream includes an endless belt conveyor that is provided with a plurality of rows of openings, each opening being adapted to receive an open top container. A dispensing magazine, mounted above the conveyor and holding a stack of open top containers for each opening of a row, releases one container from each stack simultaneously so that a container drops into each conveyor opening as the openings move under the magazine. The conveyor, upon which the containers are supported, is moved continuously to carry the containers past a filling station and a cover applying station to complete the packages which are then discharged from the conveyor. The entire packaging process is automatic, and may be carried on continuously at high speed without any manual intervention as long as the supply of cream, containers, and covers holds out. The simplicity of the operation requires a minimum amount of parts, which makes it easier to maintain the sterile conditions required when packaging food products.

Numerous advantages and features of the invention will become readily apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating the invention, in which:

FIGURE 1 is a fragmentary side view, partly in elevation and partly in section, of a preferred embodiment of the apparatus;

FIGURE 2 is a fragmentary top plan view of the structure shown in FIGURE 1;

FIGURE 3 is an enlarged fragmentary cross-sectional view of the container dispensing mechanism for positioning empty containers on the conveyor;

FIGURE 4 is a view similar to FIGURE 3 with the container dispensing mechanism in a different position;

FIGURE 5 is an enlarged fragmentary cross-sectional view, taken along the line 5—5 of FIGURE 3;

FIGURE 6 is a fragmentary top plan view of the conveyor with two of the containers positioned thereon;

FIGURE 7 is a fragmentary side view, partly in elevation and partly in section, showing the cover feeding mechanism;

FIGURE 8 is an enlarged fragmentary cross-sectional view of the closure applying mechanism;

FIGURE 9 is an enlarged fragmentary cross-sectional view of the closure applying mechanism, taken along line 9—9 of FIGURE 8, and

FIGURE 10 is a diagrammatic view of the drive mechanism for the apparatus.

Referring to the drawings, particularly to FIGURE 1, the apparatus of the present invention comprises conveyor means 11, container dispensing means 12, filling means 13, cover feeding means 14, cover applying means 15, and discharge means 16.

The conveyor means comprises a plurality of flat plates 17 each of which is secured to a pair of parallel endless chains 18 extending around suitable gears fixed to a shaft 19 near the discharge end of the apparatus and a shaft 21 adjacent the opposite end of the apparatus. The plates 17 are mounted so that the transverse edges of adjoining plates are closely adjacent each other throughout the upper reach of the conveyor. The transverse edges of each plate are provided with a plurality of oppositely disposed notches 22 and 23, respectively. Each notch 22 on one plate cooperates with a notch 23 on the adjacent plate to form an opening adapted to receive an open top container 24. In the illustrated embodiment of the invention, the conveyor is shown as being provided with four rows of openings, but it will be understood that any number of rows may be provided. The notches may be of any desired shape to form openings adapted to fit around the periphery of the container.

The containers 24 are deposited in the openings of the conveyor by a very simple dispensing magazine that is adapted to hold a stack of nested open top containers for each row of openings. The dispensing magazine may comprise four individual receptacles, or may comprise a single receptacle having means dividing it into four compartments.

In the dispensing magazine, the containers 24 are nested in individual stacks, with a stack being provided for each row of openings provided in the conveyor. Each stack of containers is supported by holding means comprising a pair of arms at opposite sides of each stack of containers. Each arm includes a lower portion 25 that is spaced longitudinally from an upper arm portion 26 to which it is connected by a narrowed web 27. The webs hold the arm portions in parallel planes, with the plane of the upper arm portions being spaced above the plane of the lower arm portions a distance approximately equal to the axial distance between the lips of two adjacent containers in the stacks of nested containers. The dispensing magazine is provided with five pairs of arms for holding and dispensing containers from four stacks. The three intermediate pairs of arms each support the containers of two adjacent stacks, and each of the two outer pairs of arms support the containers of one of the outer stacks.

Each container has an annular lip 28 extending outwardly and downwardly from its upper edge. The annular lip serves a threefold purpose. In the first place, it

stiffens the upper edge of the container to facilitate application of a cover 29 thereto and also to make it easier for the consumer to handle it after the cover has been removed. Secondly, the lip engages two arm portions 25 or 26 alternately for support of the containers in the dispensing magazine. Thirdly, as each container drops into an opening in the conveyor, its lip engages the plate 17 adjacent the opening to support the container with its upper edge at a uniform distance above the top surface of the plate.

The container dispensing mechanism is shown in detail in FIGURES 3 and 4. One end of each upper arm portion 26 is pivotally secured to a rod 31 extending between two links 32 at opposite sides of the machine. Each link 32 is pivoted to the frame of the machine, as indicated at 33. One end of each lower arm portion 25 is slidably mounted in a guide 34. The guide 34 may, if desired, be pivotally mounted to provide a slight movement to keep the guide properly aligned with the arm portion 25 as the links 32 are oscillated about their pivots 33.

In FIGURE 4, the dispensing mechanism is in its forward position, with the lower arm portions 25 engaging the annular lip 28 of the lowermost container in each of the stacks of containers, each of the containers being supported at opposite sides. The webs 27 are of less width than the space between the lips of containers in adjacent stacks, and are aligned with those spaces so that they are completely free of engagement with the containers at all times. The arms are reciprocated as a unit by links 32 which are connected to a rotatable shaft 35 by a crank 36. The length of each web 27 is less than the diameter of the top of each container and adjacent webs 27 are spaced from one another by a distance greater than the diameter of a container lip 28 so that the containers can pass freely between adjacent webs. Therefore, when the links 32 move the arm rearwardly (to the right, as viewed in FIGURE 4), the arm portions 26 will move between the lips of the two lowermost containers in each stack before the arm portions 25 are disengaged from the lips of containers being dropped onto the conveyor. As the arm portions 25 release the lowermost containers of each stack and allow them to drop to the conveyor, the arm portions 26 engage the lips of the next adjacent containers in each of the stacks to support them, and the containers above them, in a plane spaced axially above the plane of the arm portions 25.

The pivotal movement of the links 32 is synchronized with the movement of the conveyor so that the containers released from the arm portions 25 drop into the openings made by the adjoining notches 22 and 23 of adjacent plates 17. The containers fit into the openings easily, and the lips of the containers engage the plates 17 adjacent the notches 22 and 23 to support each of the containers as the conveyor moves them through the various stations hereinafter described.

When containers are seated in the openings of the conveyor, the conveyor moves them under nozzles 37 mounted in a suitable pivoted support 38. A link 39 has one end pivotally secured to the lower end of the support 38 and its other end pivotally secured to a crank pin 41 eccentrically mounted on a disk 42 fixed to the shaft 35. A second link 43 is pivotally connected at opposite ends to the support 38 and a stationary plate 44. Rotation of the shaft 35 moves the support 38 vertically so as to move nozzles 35 downwardly into containers in vertical alignment therewith, and upwardly out of said containers. A fulcrum block 45 is fixed to the frame by a bolt 46 that extends through an elongated slot 47 in the link 39. The bolt 46 causes the nozzles 37 to move with the containers until the link 39 moves them out of the containers. The link 39 moves the support 38 upwardly and back to its initial position to make it ready for movement with the next row of containers to which the nozzles are to supply fluid.

The flow of cream through the nozzles is controlled by a valve (not shown) that is opened by the downward movement of the link 39 and is closed by its upward movement. The flow capacity of each nozzle is so designed that each of the containers is filled the requisite amount by the cream discharged through a nozzle in a single cycle of the filling mechanism while it is being continuously moved toward the cover applying station by the conveyor.

As the conveyor moves the filled containers to the cover applying station, another mechanism is moving rows of covers thereto at a speed synchronized with the conveyor so that a cover 29 is placed on each container 24 and secured thereto at the cover applying station as part of the continuous process.

The covers 29, in the form of continuous strips 48 spaced laterally a distance equal to the spacing between the rows of containers, are supported on a flat platform 49 one end of which terminates adjacent a cutting mechanism 51. The strips 48 are fed to the cutting mechanism intermittently by pushers 52 pivotally secured to a rod 53 that is reciprocated by links 54. The links 54 are oscillated by a rotating shaft 55. Holding detents 56 are pivotally mounted on a rod 57 with the free end of each detent adapted to ride over the covers in the related strip 48 as the pushers 52 move the strips toward the cutting mechanism. Each detent is adapted to engage the covers in the related strip 48 to prevent the pusher 52 from moving the strip backwards as the pusher is moved rearwardly at the end of a pushing operation.

The cutting mechanism 51 extends transversely of the strips 48 and comprises a lower cutting blade 58 fixed below the strips adjacent the free end of the platform 49, and an upper cutting blade 59 mounted above the strips 48 for vertical reciprocation into and out of engagement with the lower blade. The upper cutting blade 59 is reciprocated by a link 61 pivotally connected to a second link 62 that is oscillated by the rotating shaft 55. The cutting blade severs a cover 29 from each of the strips 48 on each downward stroke.

The cover applying mechanism comprises a cylindrical drum 63 mounted on a continuously rotating shaft 64. The drum is horizontally disposed and extends transversely of the conveyor with its periphery spaced a short distance above the top of the conveyor. The drum has eight circumferentially extending rows of pins 65 projecting outwardly from its peripheral surface. The pins of each row are uniformly spaced circumferentially of the drum a distance equal to the longitudinal center-to-center spacing of the container receiving openings in the conveyor 11. The cutting blade 59, is synchronized with the drum so that every time a row of pins passes the cutting mechanism, the cutting blade severs a cover from each strip 48.

Each cover 29 has a center portion dished downwardly to form a boss 66 having approximately the same perimeter as the top of the container. The rows of pins 65 are arranged in pairs, and each pair of transversely spaced pins is so arranged that each cover drops on a pair of pins, with both pins positioned within the boss 66, as the pins pass the cutting mechanism. The pins carry the covers 29 into engagement with the open tops of the containers 24 as the drum 63 rotates. A single pin 65 is sufficient for this purpose when the covers are circular, but two pins are used in the embodiment illustrated because, as shown in FIGURE 6, the tops of the containers and the covers are noncircular. The two pin arrangement prevents turning or lateral displacement of the covers as they are carried toward the containers.

A guide member 67 cooperates with each pair of pins to hold the covers in place against the drum until they are positioned on the tops of the containers. Each guide member 67 comprises a vertically disposed plate positioned rearwardly of the drum 63 with its front edge curved to conform to the curvature of the drum and

5

spaced therefrom to permit movement of the covers from the cutting mechanism to the area in which the covers are positioned on the containers. The top portion of the front edge of each guide 67 is adjacent the cutting mechanism, and the lower portion of the front edge of the guide terminates adjacent the bottom of the drum. The guide members are mounted on two rods 68, 69 with spacers 71 on each rod holding the guide members in desired spatial relationship.

The drum 63 is synchronized with the conveyor 11 so that as each cover 29 clears the lower end of its guide member 67, it is directed onto the top of a container 29 passing under the drum. The cover 29 has an annular lip 72 adapted to fit over the lip 28 of the container, and the pins 65 press the cover into sealing engagement with the top of the container. A backup roll 73 having a plurality of annular flanges 74 is mounted on a shaft 75 below the bottom of the drum 63. The flanges 75 engage the underside of the conveyor 11 to provide support in the area where the pressure is applied for pressing the cover into sealing engagement with the container.

The completed packages are cammed out of engagement with the conveyor by a flat plate 76 located under the upper reach of the conveyor between the closure applying station and the discharge end of the conveyor. The plate 76 is inclined upwardly toward the discharge end of the conveyor so that the bottom of each container is moved into engagement with the plate of each container is moved into engagement with the plate by the conveyor after the closure has been applied to the container. As the movement of the container is continued, the plate 76 forces it upwardly, and as the plates 17 turn downwardly about the shaft 19, the container engages a guide member 77 that causes it to slide downwardly to a convenient packing station.

The synchronization of the various mechanisms for insuring proper timing of the different steps of the process is achieved by means of a common drive that is shown schematically in FIGURE 10. A continuous chain 78 driven by a motor (not shown) extends around a tensioning gear 79 and gears 81, 82, and 83. The chain also engages another gear 84 between the gears 82 and 83. The gear 81 is operatively connected to the shaft 19 that drives the conveyor 11. The gear 82 is fixed to the shaft 55 that oscillates the links 54 for feeding the strips 48 to the cutting mechanism 51 and the link 62 for reciprocating the cutting blade 59. The gear 84 is operatively connected to the shaft 64 for rotating the drum 63. The gear 83 is fixed to the shaft 35 that controls the oscillation of the links 32 to release the containers 24 from the dispensing magazine. The disk 42 for controlling the filling nozzles 37 is also fixed to the shaft 35.

Although a preferred embodiment of the invention has been described in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of construction may be modified or changed without departing from the spirit or scope of the invention. Accordingly, it is not desired to be restricted to the exact details of structure described.

What is claimed is:

1. An apparatus for packaging liquid comprising continuously movable conveyor means, means for positioning individual containers on said conveyor means in longitudinally spaced transversely extending rows, means for simultaneously filling each container in a row with liquid as it is being moved by said conveyor means, and means for simultaneously applying a separate performed cover to each filled container in a row to form self-contained completed packages as said containers are being moved by said conveyor means.

2. An apparatus as recited in claim 1 in which said conveyor means has a plurality of longitudinally spaced transversely aligned openings and said containers are supported in said openings, said apparatus having cam

6

means for shifting said containers upwardly out of said openings to facilitate the release of said packages from said conveyor means.

3. An apparatus as recited in claim 1, said apparatus having a single drum means for carrying covers into engagement with said filled containers, said drum means being rotatably mounted with a portion of its peripheral surface adjacent the upper edges of the filled containers carried by said conveyor means.

4. An apparatus as recited in claim 3 in which said single drum means comprises a generally cylindrical drum and transversely aligned pin means projecting generally radially outwardly from said drum, said pin means engaging said covers and pressing them into sealing engagement with said filled containers.

5. An apparatus as recited in claim 4, said apparatus having guide means for holding said covers against said drum, said guide means having an arcuate guide surface spaced from and generally concentric with the outer periphery of said drum for a range of approximately 180° to guide said covers as they are moved by said pin means in an arcuate path between said drum and said guide surface and into engagement with said filled containers.

6. An apparatus as recited in claim 1, in which said second mentioned means comprises a magazine for housing a plurality of transversely aligned stacks of nested containers above said conveyor means and release means for simultaneously releasing the lowermost container of each stack to provide a transverse row of containers, said apparatus having means synchronizing said release means and said conveyor means.

7. An apparatus as recited in claim 6, in which said release means comprises a plurality of pairs of arms, each pair of arms being operatively associated with each stack of containers, each arm of said pairs of arms comprising a generally planar upper arm portion and a generally planar lower arm portion, said arm portions being spanned by an inclined narrowed release portion, and means to move said arms alternately in opposite directions into positions of supporting engagement with said stacks of nested containers, the arms of each pair being spaced so that in one position the lower arm portions engage the lowermost container of each stack when in supporting engagement with said stacks and in a second position the upper arm portions move into supporting engagement with the next adjacent container in each of said stacks when said lower arm portions are moved to position said narrowed release portions in alignment with said containers to free said lowermost containers from said supporting engagement.

8. An apparatus as recited in claim 1 in which said container filling means comprises a discharge spout for each container in a row, each spout having its lower end positioned above said conveyor means, said apparatus including means for moving the lower end of each discharge spout into one of said containers as liquid is discharged through said spout and for raising each spout as said containers are filled, to prevent splashing of the liquid discharged into said containers.

9. A method of packaging liquid in open top containers each having a lip extending outwardly from its upper edge, said method comprising the steps of holding plurality of longitudinally spaced transversely extending rows of containers with the upper edge of each container in a predetermined horizontal plane, moving each row of said containers continuously from its initial position to a discharge station, automatically filling each row of said containers with liquid, simultaneously positioning a separate preformed cover on the open top of each container in a row, and simultaneously pressing each cover into sealing engagement with the open top of its respective container as said containers are being moved toward said discharge station with their upper edge in said plane.

10. The method recited in claim 9 including the step of forming said transversely extending rows of containers by automatically releasing individual containers from nest-

ed stacks of containers at uniform intervals, and allowing each container to drop until its lip engages a supporting surface.

11. The method recited in claim 9 including the steps of moving covers in the form of a continuous strip intermittently in a rectilinear path to a cutting station, cutting said strip into individual covers, and then moving said covers continuously in an arcuate path into engagement with said containers.

12. A dispenser for a stack of nested containers each having an outwardly extending lip at its upper edge, said dispenser comprising a pair of spaced generally parallel arms, each arm including a generally planar upper arm portion and a generally planar lower arm portion, said arm portions being spaced apart a distance approximately equal to the axial distance between the lips of adjacent containers in said stack, said arm portions being spanned by an inclined narrowed release portion, the lower arm portions and upper arm portions being adapted to alternately engage the lip of the lowermost container in said stack at opposite sides thereof to support said stack of nested containers at different levels, and means for moving said pair of arms in opposite directions to move said release portions into alignment with said stack to free the lowermost container, said last named means alternately moving said upper and lower arm portions into and out of engagement with said stack, whereby disengagement of said lower arm portions from said stack release the lowermost container from said stack as said upper arm portions move into engagement with the next lowest container of said stack, and disengagement of said upper arm portions from said stack releases said last mentioned container for engagement by said lower arm portions at a lower level.

13. A dispenser as recited in claim 12 including guide means slidably supporting the arm portions at one end of said pair of arms, a link pivotally secured to an opposite end of said pair of arms, and means to move said link to reciprocate said arms simultaneously.

14. Apparatus for closing containers being moved in a

fixed plane, said apparatus comprising means for feeding a continuous strip of cover material in a rectilinear path spaced from the plane of container movement, a generally cylindrical drum rotatably mounted with a first portion of its peripheral surface adjacent the plane of container movement and a second portion of its peripheral surface adjacent the path of cover strip movement, said second drum surface portion being spaced approximately 180° from said first drum surface portion, means for rotating said drum, means for severing said strip of cover material to form individual covers, pin means projecting generally radially outwardly from the peripheral surface of said drum, said pin means engaging said individual covers to carry them into engagement with said containers, and guide means having an arcuate guiding portion extending between said first and second drum surface portions and shaped to conform to the curvature of the periphery of said drums, said guiding portion being engageable with covers carried by said pin means and confining said covers for movement along an arcuate path to prevent disengagement of said covers from said pin means prior to engagement of said covers with said containers.

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U.S. Cl. X.R.

53—282, 296, 314; 221—93, 221

U.S. DEPARTMENT OF COMMERCE

PATENT OFFICE

Washington, D.C. 20231

**UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION**

Patent No. 3,440,794

April 29, 196

Martin Mueller

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 47, "peripheral" should read -- peripheral --. Column 5, line 18, "flanges 75" should read -- flanges 74 --; lines 28 and 29, cancel "of each container is moved into engagement with the plate.". Column 6, line 61, before "plurality" insert -- a --. Column 7, line 28, "release" should read -- releases --.

Signed and sealed this 14th day of April 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents