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3,058,276

BOTTLE WASHING, FILLING, CAPPING AND STERILIZING DEVICE

Filed Dec. 29, 1960

3 Sheets-Sheet 1

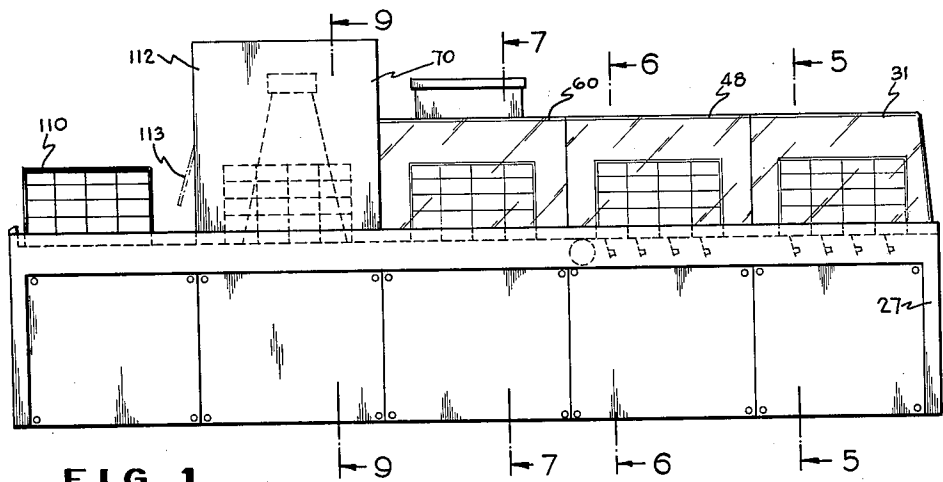
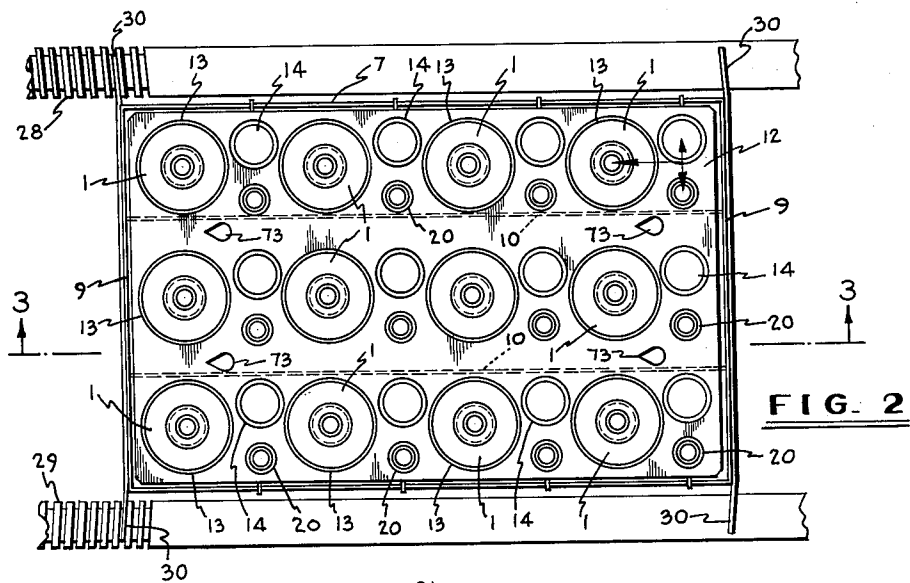
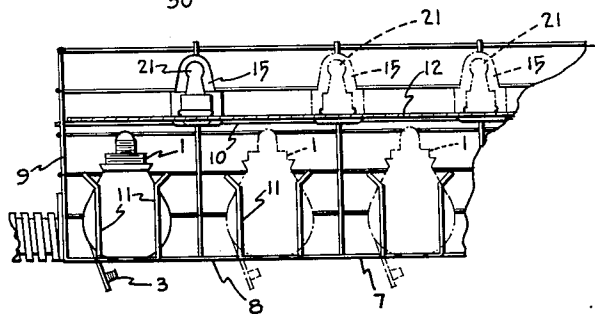
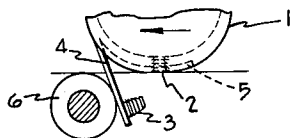


FIG. 4

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3 Sheets-Sheet 2

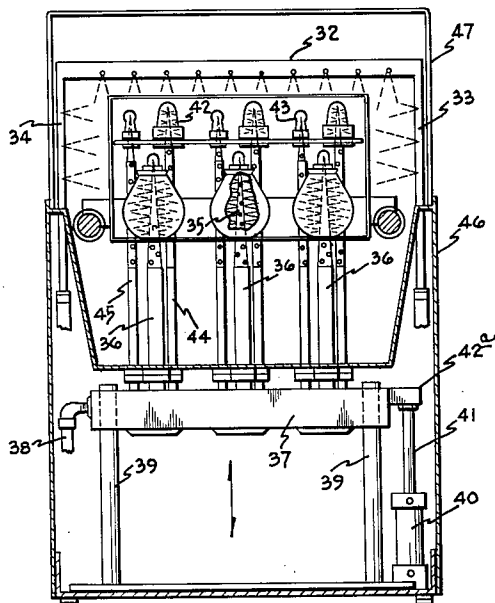


FIG. 5

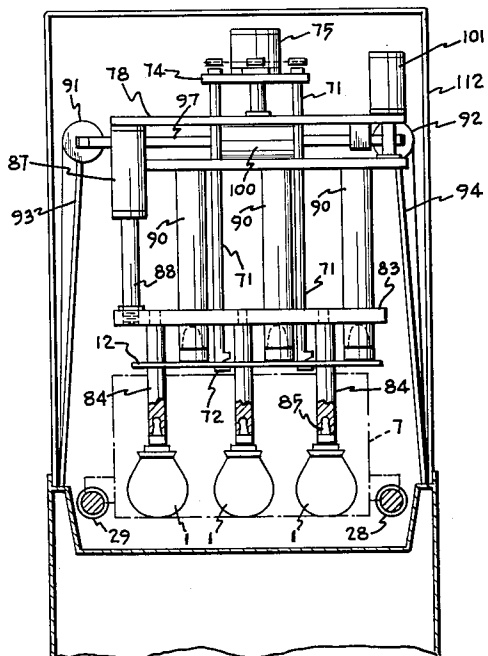


FIG. 9

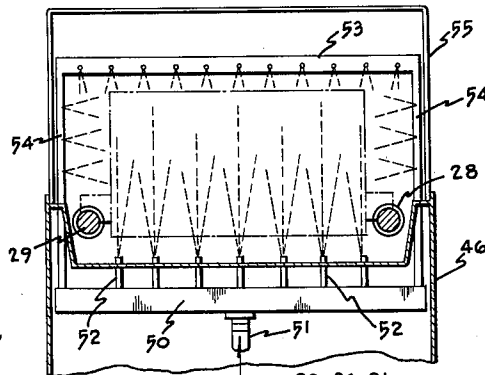


FIG. 6

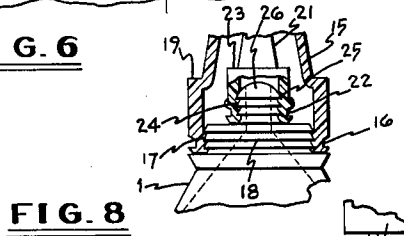


FIG. 8

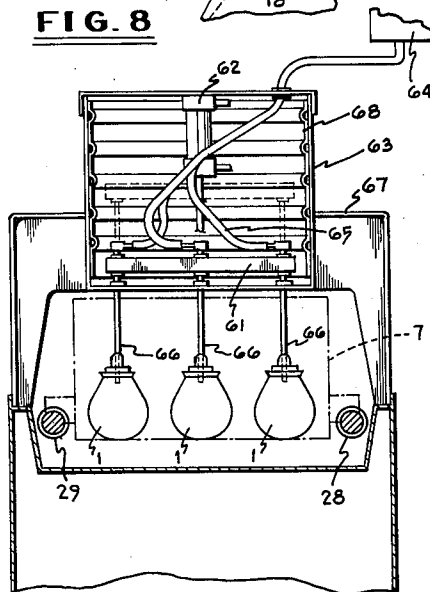


FIG. 7

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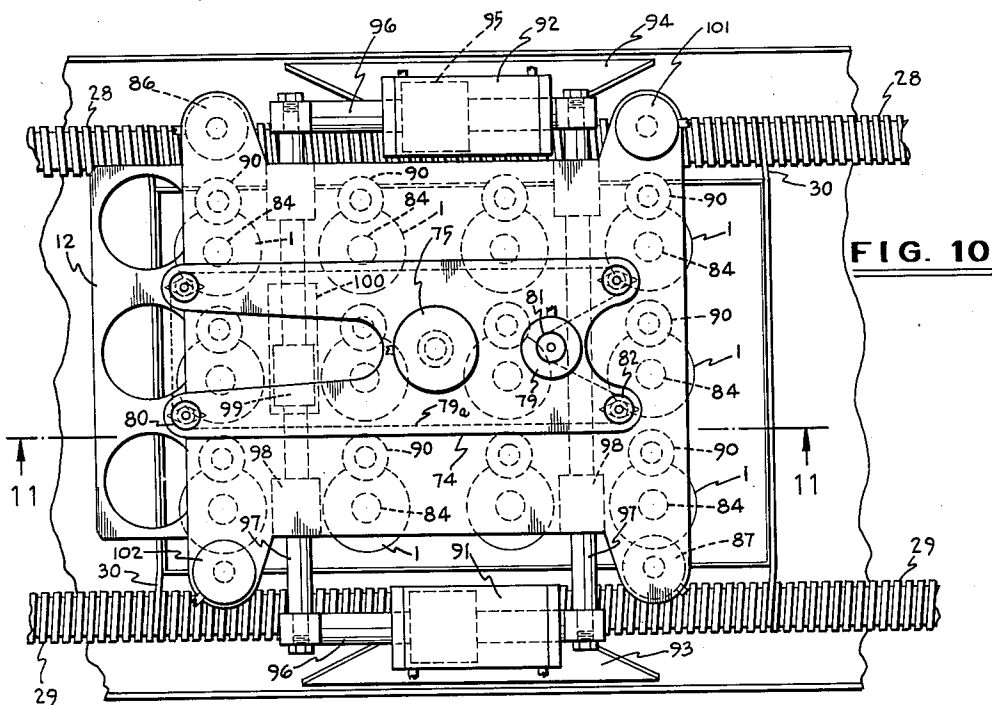
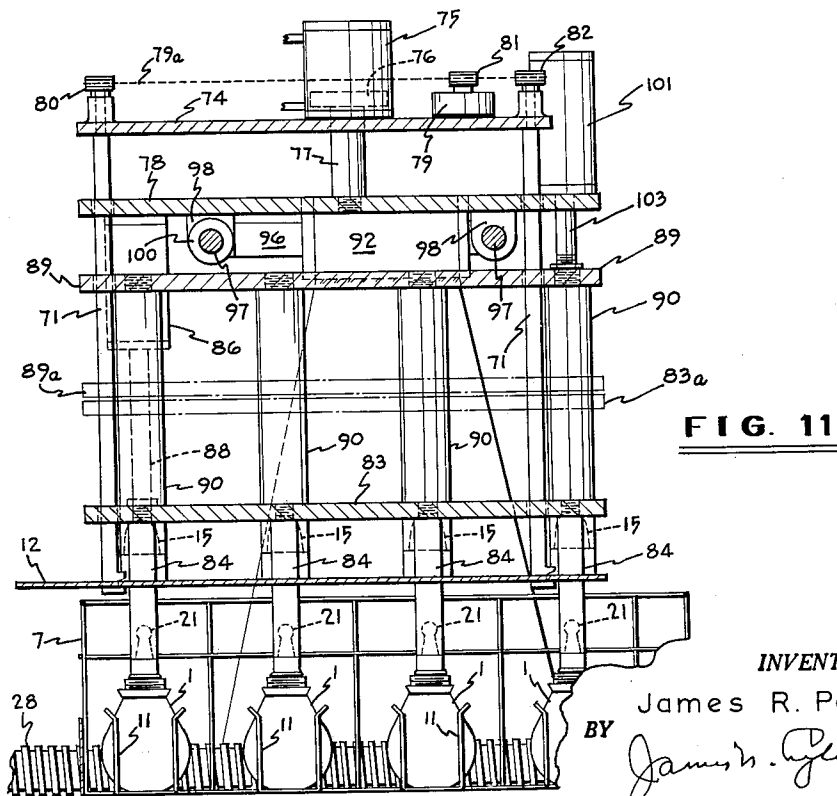
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3 Sheets-Sheet 3



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BOTTLE WASHING, FILLING, CAPPING AND STERILIZING DEVICE

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17 Claims. (Cl. 53-167)

This invention relates to an apparatus for cleansing and filling bottles and more particularly to bottles used for nursing purposes and holding liquid foods such as the so-called "formula" used for the feeding of infants.

In hospitals, nurseries and various institutions caring for infants, the cleansing and filling of nursing bottles involves much time, attention and labor. This is also true of concerns which supply the filled bottles to various institutions and to mothers for use by their babies. Most of the work involved in carefully cleansing the bottles, washing and sterilizing the bottles and nipples and filling the bottles is done by hand operation aided somewhat by simple appliances which do not materially decrease the time involved in cleansing and filling the bottles and applying the nipples thereto.

It is therefore one of the objects of the present invention to provide an apparatus by which thorough cleansing and rinsing of nursing bottles, nipples and protective caps therefor, will be facilitated, with the bottles thereafter filled with the liquid food; the nipples then applied to the bottles and the protective caps then applied to the tops of the bottles over the nipples thereon.

It is an object of the invention to provide an apparatus in which the bottles, nipples and caps will be conveyed from a cleansing station to a rinsing station and there thoroughly rinsed, and therefore made ready for filling at the next station to which the bottles are transported. At such station a predetermined amount of the liquid food will be filled in each bottle. Then a nipple will be applied to each bottle and a protective cap fitted on each bottle over the nipple thereon, and the bottles, nipples and caps subjected to sterilization.

It is an object of the invention to provide an apparatus in which the aforementioned operations will be automatically, speedily and accurately performed.

With these and other objects to be hereinafter set forth in view, I have devised the arrangement of parts to be described and more particularly defined in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed:

FIG. 1 is a side elevational view of a bottle-cleansing and filling apparatus constructed according to the invention;

FIG. 2 is a top plan view of one of the baskets containing the bottles, nipples and caps, and showing the engagement of the basket with the screw conveyors;

FIG. 3 is a vertical sectional view through a portion of one of the baskets;

FIG. 4 is a detail view of the lower portion of one of the bottles, showing the closure means for its bottom opening and the roller employed for effecting the closure;

FIG. 5 is a sectional view, taken substantially on the line 5-5 of FIG. 1, looking in the direction of the arrows;

FIG. 6 is a sectional view, taken substantially on the line 6-6 of FIG. 1, looking in the direction of the arrows;

FIG. 7 is a sectional view, taken substantially on the line 7-7 of FIG. 1, looking in the direction of the arrows;

FIG. 8 is a vertical sectional view through the top or upper portion of one of the bottles, showing how a

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nipple and a cover or cap therefor is fitted on the bottle;

FIG. 9 is a sectional view, taken substantially on the line 9-9 of FIG. 1, looking in the direction of the arrows;

FIG. 10 is a top plan view of the mechanism for applying the nipples to the bottles and applying the caps or covers thereover, and

FIG. 11 is a sectional view, taken substantially on the line 11-11 of FIG. 10, looking in the direction of the arrows.

The present invention contemplates the provision of means by which the bottles are first internally scrubbed while being also washed; then internally and externally rinsed by spray-rinsing. The bottles then have their bottom openings closed and the bottles are then filled with the liquid food. Nipples are then fitted on the bottles and caps or covers are applied over the nipples and the bottles and applied nipples and caps sterilized.

Various types of bottles might be used, but the present invention contemplates the use of a special type of bottle found useful in connection with the hereindescribed apparatus. Such bottle is preferably, although not necessarily, of the globular type clearly shown in FIGS. 3, 4 and 7, and it is preferably made of a plastic material. Each bottle 1 is provided with a central opening 2 in its bottom wall, which opening may be conical and may have its wall ribbed, as shown in FIG. 4. The opening 2 is adapted to be closed by a complementary conical, ribbed plug 3 formed adjacent to the end of a flexible flap 4 constituting an integral part of the bottom of the bottle.

A recess 5 is formed in the bottom of the bottle, said recess conforming in shape to the flap 4 so that when the plug 3 is fitted into the opening 2 and is effective to close the same, the flap 4 will fit into the recess 5 and will lie flush with the bottom of the bottle. In the apparatus to be described, a roller 6 is arranged in the path of travel of the bottles and the roller is effective to force the flaps 4 into the recesses 5 and cause the plugs 3 to enter into and close the openings 2 in the bottles.

The bottles to be treated are placed in a wire basket or holder generally indicated at 7, and the same includes a bottom 8, ends 9 and partition members 10. In the form shown, each tray or bottle holder is arranged to hold and convey twelve bottles but the basket or holder may well be of a size to hold a greater or lesser number if desired. The bottles 1 are maintained in uniformly-spaced relation in the basket and in an upright position as shown in FIG. 3, by means of spring fingers or clips 11 provided in the basket.

Located in the basket above the bottles therein and disposed horizontally, is an apertured plate 12. The plate 12 is formed with a number of relatively large apertures 13, each of which is of a size slightly larger than the greatest diameter of the bottles 1. The plate is also formed with smaller apertures shown at 14 and 20. The apertures 14 are of a size to enable closure caps or protective covers 15 (FIG. 8) to be fitted in them with a snap fit. For this purpose, each of the caps or covers 15 is provided with a circumferential groove 16 and since the cap or cover is composed of flexible material such as a suitable plastic or rubber, it can be flexed or sprung sufficiently to enable the groove 16 to engage with the aperture 14 and thus attach the cap or cover to the plate. Each of the caps or covers is ribbed internally, as shown at 17, to enable it to engage the ribs 18 provided at the top or neck of the bottle 1 to thus hold the cap or cover in place thereon after having been forced into position. Also provided on each of the caps or covers 15 is an annular shoulder 19, the purpose of which will be hereinafter described.

The smallest of the apertures in the plate 12, or those

shown at 20 is located adjacent to each of the apertures 14. Each of the apertures 20 is of a diameter to enable it to receive and hold a nursing-bottle nipple 21, which nipple is provided with a circumferential groove 22 adapted to engage with the edge of the aperture 20 to thus attach the nipple to the plate 12 and cause the nipple to be disposed in an upstanding or upright position thereon, as shown in FIG. 3. An annular shoulder 23 is provided on each nipple and the interior of the nipple is ribbed as shown at 24 for engagement with the ribs 25 provided on a small diameter portion 26 located at the top of the bottle.

It will be noted that the arrangement of the apertures 13, 14 and 20 is such, that when the plate 12 is in position in the upper part of the basket 7, the apertures 13 will be vertically aligned with the bottles in the basket so that access to the tops of the bottles will be available. The arrangement of the apertures in the plate 12 is such that there is provided for each bottle a nipple 21 and a cap or cover 15, these elements being eventually fitted to the top of each bottle in the manner shown in FIG. 8.

The apparatus includes a frame generally indicated at 27, and mounted for intermittent rotative movement in said frame are spaced, parallel, screw feeders or screw conveyors indicated respectively at 28 and 29. The basket 7 is adapted to be mounted on these conveyor screws, and each basket is thus provided at its four lower corners with projecting lugs or ears 30 adapted to engage with the spiral thread on the conveyor screws so that the rotative movement of the conveyor screws in the required direction will be effective to move the basket 7 and its contents from right to left as viewed in FIG. 1.

In FIG. 1 of the drawings, 31 indicates generally the scrubbing or washing station. The filled basket 7 is moved by the conveyor screws 28 and 29 to this station and to a position below an apertured spray pipe 32 from which jets of cleansing fluid are ejected onto the bottles in the basket. At the same time, spray pipes 33 and 34 located along the opposite sides of the basket, direct streams or jets of the fluid inwardly into the tray and against the bottles therein. At a halt in the travel of the basket, a plurality of rotating brushes 35 enter into the bottles 1 and scrub the interior of the same while internally spraying the bottles. The brushes 35 are mounted at the upper ends of pipes 36 secured at their lower ends to a fluid manifold 37 into which the cleansing fluid is forced from a suitable source by way of the piping 38, which includes flexible tubing to permit the required raising and lowering movement of the manifold and the pipes 36 carried thereby. The manifold 37 is thus in the form of an elevator slidably guided on posts 39. The raising and lowering of the manifold, in properly timed relation to the halting of the basket, is effected by means of one or more hydraulic cylinders 40, operative on a contained piston to which a piston rod 41 is connected, said rod 41 being attached to a lug 42^a projecting from the manifold 37 as clearly seen in FIG. 5. In addition to the brushes shown at 35, and which brushes are effective to cleanse the interiors of the bottles, additional brushes 42 and 43 are carried at the top of the manifold 37 and are raised and lowered therewith. The brushes 42, carried by tubes 44 enter into the interiors of the caps or covers 15 and brush as well as spray the same. The tubes 44 are in communication with the interior of the manifold 37 so that fluid is supplied to the brushes 42 therefrom.

The brushes shown at 43 are employed to brush the interiors of the nipples 21 while spraying the same, and the brushes 43 are carried at the upper ends of tubes 45 which are carried by and are in communication with the manifold 37. All of the brushes, namely, the brushes 35, 42 and 43, can be rotated by suitable drive means or they can be caused to rotate by the force of the water emanating through suitably positioned jet openings at the ends of the bristle mountings. The brushing and spraying mechanism is suitably housed in a casing, including

the lower part 46 and a cover or hood portion 47, the latter portion being preferably of transparent material.

It will be apparent from the foregoing, that as each basket containing bottles, nipples and caps or covers therefor, reaches a position below the spray pipe 32 and between the spray tubes 33 and 34, a pause in the operation of the screw conveyors will take place and at which time the brushes 35, 42 and 43 will be elevated to respectively enter the bottles, closure caps and nipples and brush the interiors of the same while spraying them. After a predetermined amount of brushing and spraying has taken place, the conveyor means again resumes its rotation to move the basket to the next station, or that shown at 48, where the rinsing operation is had.

The mechanism for effecting the rinsing operation is shown in FIG. 6, and the same includes a water manifold 50 into which water is supplied through piping 51, the manifold being provided with a plurality of upwardly-directed nozzles 52 from which jets of water are ejected. These nozzles are so positioned relatively to the bottles in the basket that they register with the bottom openings 2 in the bottles during a halt in the travel of the basket, and the water jets from the nozzles are ejected upwardly and into the interiors of the bottles to thereby rinse out the same. At the same time, the exteriors of the bottles, the caps or covers and the nipples are sprayed by jets ejected from spray openings provided in spray pipes 53 and side tubes 54. A hood or closure 55 is provided for the rinsing apparatus above described, and which hood may also, if desired, be composed of transparent material. The rinsing mechanism just described is effective to thoroughly cleanse the bottles, the caps and the nipples and acts to rinse off any remains of the first washing fluid so that at the conclusion of the rinsing operation, the bottles, nipples and caps are in readiness to be moved to the filling apparatus.

The filling apparatus is located at the station indicated at 60 in FIG. 1, and it is shown in detail in FIG. 7. The same includes an elevator 61 which is raised or lowered by means of a hydraulic cylinder 62 mounted in a turret 63. At 64 is shown a tank or reservoir containing a supply of the liquid food or so-called "formula" with which the bottles are to be filled. Leading from the tank or reservoir 64 are flexible tubes 65 connected to feed pipes 66, and one of each of which pipes is provided for each of the bottles carried in the basket 7. This arrangement is such that at the conclusion of the rinsing operation, the basket will be moved by the conveyor screws to the filling station 60 where the basket will halt and at which time the feed tubes 66 will be vertically aligned with the mouths of the bottles in the basket. By the action of the hydraulic means 62, the elevator 61 will be lowered, causing the feed pipes 66 to enter the bottles and deposit a required and predetermined amount of the liquid food into the same. Any means of known construction for regulating the amount of the fluid deposited into each bottle can be used. A hood or cover 67 of transparent nature may be used to enclose the filling means and the turret portion 63 is preferably provided in its interior with a grooved plate for a cooling or heating medium to maintain the liquid food at the required temperature.

When the basket was at the rinsing station 48, the bottom openings 2 in the several bottles in the basket were open so that access by the spray water to the interior of the bottles was permitted. The filling of the bottles at the filling station 60 requires the closure of the bottom openings 2 and such closure is effected by the roller 6 which extends transversely of the apparatus and is positioned in the path of travel of the flaps 4 on the bottles. Thus, as clearly shown in FIG. 4, when the flaps 4 on the bottles come into contact with the roller 6 as the basket travels from the rinsing station to the filling station, the flaps 4 are lifted by the roller 6 and the plugs 3 on the flaps are forcibly inserted into the openings 2 to close the

same. As a result, when the basket reaches the filling station, the bottle openings 2 in all of the bottles will have been closed and the bottles thus placed in readiness for filling in the manner described.

After the bottles are filled, they are transported by movement of the basket, to a station indicated at 70 in FIG. 1, where the application of a nipple 21 and a cap 15 to each of the bottles in the basket takes place. The mechanism for effecting this result is shown in FIGS. 9 to 11 inclusive. Since the nipples and caps carried by the plate 12 are vertically disaligned from the bottles, it is necessary that means be provided to align the nipples with the tops of the bottles before the nipples are forced downwardly out of the plate 12 and fitted on the tops of the bottles.

It will be observed in FIG. 9 that extending through the plate 12 are four rods 71 provided at their lower ends with non-round heads 72 so shaped that they can enter through pear-shaped apertures 73 provided in the plate 12. These rods form a part of a vertically-reciprocated carriage including a plate 74 from which the rods project downwardly. The carriage is raised and lowered to the required extent by hydraulic means including a cylinder 75 mounted on the plate 74 and containing a piston 76. The piston is fixed, the same being mounted on a rod 77 secured in a fixed plate 78. The rods 71, which are slidable through the fixed plate 78, have a limited oscillating movement attained from a motor 79 mounted on the plate 74 and operative to drive a chain or belt drive 79a extending between sprockets or pulleys 80, 81 and 82 to rotate the rods to the required extent. This arrangement is such that when the basket is halted by cessation of conveyor operation, at the proper position at station 70, the plate 74, carrying the rods 71, will be lowered and the rods 71 will enter the openings 73 in the plate 12 and be rotated for a portion of a turn to thereby lock the rods to the plate 12. After this occurs, the plate 74, with its rods 71 now engaged with the plate 12, will be elevated to the position shown in FIG. 11, thereby lifting the plate 12 out of the basket 7 and raising it above the top of the basket. As previously stated, preparatory to placing a nipple on each of the bottles, it is necessary that the nipples, then carried by the elevated plate 12, be vertically aligned with the tops of the bottles in the basket or bottle holder.

At 83 is a plate adapted for raising and lowering movement, the same in its elevated movement, reaching the position substantially shown in dot-and-dash lines at 83a in FIG. 11. Plate 83 is provided with downwardly-projecting plungers 84 having their lower extremities recessed as shown at 85 in FIG. 9, the recesses being so formed that they fit over the nipples 21 while the lower end of each of the plungers engages against the annular shoulder 23 on each nipple and is effective, on downward movement of the plungers to force the nipples out of the openings 20 and bring them into position on the tops of the bottles, substantially as shown in FIG. 8. Thus, when the plate 83 carrying the plungers 84, descends, each of the plungers will contact a nipple, force the same through the opening 20 and then fit it on top of the bottle then positioned in the basket below it. The plate 83 is raised and lowered by hydraulic means including cylinders 86 and 87, mounted on the plate 78 and having their pistons connected by rods 88 to the plate 83.

After the nipples 21 are fitted on the bottles, the protective caps or covers 15 are fitted on the tops of the bottles over the nipples thereon as shown in FIG. 8. A vertically-reciprocating plate 89 carries a plurality of plunger members 90, each of which has a recessed lower end fitting over a cap and operative against the annular shoulder 19 on each cap to thereby force the cap down through the opening 14 in plate 12 and seat the cap on top of the bottle then positioned beneath it. The plate 89 and its attached plungers 90 are vertically reciprocated

by hydraulic means including cylinders 101 having their pistons connected by rods 103 to plate 89.

After the nipples have been applied to the bottles it is necessary to vertically align the caps or covers in plate 12 with the bottles so that upon descent of the cap-applying plungers 90 the caps will be properly affixed to the bottles over the nipples thereon. In order to secure the required alignment above described, the plate 12 carrying the nipples and caps, as well as the plungers 84 and 90 must be shifted both longitudinally and transversely of the basket.

When the basket is freed of the plate 12 and the plate 12 is elevated above the basket, the plate is in a position to permit the required shifting movement to secure the vertical alignment of the caps with the bottles. While the plungers 84 and 90 are in raised position above the basket, plate 78 is shifted to the left, as viewed in FIG. 10 by hydraulic means including the cylinders 91 and 92 respectively supported on brackets 93 and 94 projecting upwardly from the frame of the machine. A piston 95 is operative in each of the cylinders, each piston being secured on a rod 96 extending between and attached to cross rods 97 slidably guided through lugs 98 provided on the under side of the plate 78. One of the rods 97 carries a piston 99 operative in a hydraulic cylinder 100.

The arrangement just described is such that by operation of the hydraulic means, the plate 12, in elevated position, as well as the plungers 84 and 90 vertically aligned with the nipples and caps carried by the plate 12, will be first moved to position the nipples above the bottles. Plate 83, carrying the plungers 84, will descend and the plungers 84 will force the nipples downwardly and out of the apertures 20 and apply them to the tops of the filled bottles then located directly below them. Plate 83 will then rise and the plate 12 and the plunger mechanism will be shifted transversely, or from the top of FIG. 10 in a direction toward the bottom of the figure, by the hydraulic means 99, 100. This will vertically align the caps in the plate 12 with the bottles beneath them. The plate 89 then descends under the influence of the hydraulic means 101, 102 to the position 89a (FIG. 11) substantially as indicated by the dot-and-dash lines, and the plungers 90, carried by the plate 89, will apply the caps or covers 15 to the bottles over the previously-applied nipples. When the caps or covers applied as above described are fitted on the bottles, the plate 12 is then moved to position it over the basket; it is permitted to descend into the basket and rods 71 are rotated to release it therein.

While the nipples and caps are being applied, or else directly after their application, and while the basket is located at station 70, the bottles, nipples and caps can be sterilized by heat or other sterilizing medium. If desired, the nipped and capped bottles can, after the completion of the nipping and capping operations at station 70, be passed through a separate sterilization chamber so that when they emerge therefrom, such as at the point indicated at 110 in FIG. 1, the filled, nipped and capped bottles contained in the baskets will be ready for use.

From the foregoing, the operation of the described apparatus will be readily understood. Baskets 7 containing the bottles 1, and plate 12 bearing nipples 21 and caps 15 are successively placed on the screw conveyors 28 and 29 at a point at the right in FIG. 1. At this time the plugs 3 for the bottom openings 2 in the bottles are out of the openings and the flaps 4 on which the plugs are formed, hang dependently from the bottoms of the bottles. At station 31 the rotating brushes 35, 42 and 43 are elevated and they enter the bottles, nipples and caps while a cleansing fluid is sprayed inside and outside of these elements to thoroughly cleanse the same. This operation occurs during a halt of the basket. Next the basket is moved to the rinsing station 48 where jets of rinsing fluid, such as hot water, rinse

the inside and outside of the bottles, nipples and caps. Then the basket is moved to the filling station 60 and on its way thereto the plugs 3 are caused to be inserted in the openings 2 in the bottoms of the bottles by roller 6 to thereby close such openings. When the basket reaches the filling station and is halted thereat, the feed tubes 66 are lowered and they fill the bottles to the required extent. The tubes 66 are then raised to bring them out of the bottles and out of the path of travel of the basket.

The conveying means then become operative to move the basket, bringing it to the nipple and cap-applying station 70. Here the plate 12, carrying the nipples and caps, is raised out of the basket and it is carried angularly or both longitudinally and transversely for a distance necessary to vertically align the nipples with the bottle tops. The plungers 84 are then brought down to force the nipples out of the apertures 20 and apply them onto the tops of the bottles. Plungers 84 are then elevated and the plate 12 is moved in a manner to then align the centers of the caps 15 with the centers of the bottle tops. Plungers 90 are then moved downwardly and they force the caps 15 out of the apertures 14 in the plate 12 and apply the caps to the large diameter part 18 at the top of each bottle, the caps thus fitting over and covering and sanitarily protecting the nipples. During the application of the nipples and caps, or subsequently thereto, the bottles, nipples and caps can be sterilized, so that when the basket and its contained filled, nipped and capped bottles emerges from the cover or hood 112, passing out through the hinged door 113 (FIG. 1) the bottles are ready for use.

Having thus described a single embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In an apparatus for cleansing, filling and capping bottles, a washing station, a rinsing station, a filling station and a nipple and cap-applying station, conveying means for transporting a container of bottles to the washing station, a plate carrying nipples and caps, said plate being carried by the container, the bottles each having a bottom opening, bristled means at the washing station insertable through the bottom openings in the bottles and also into the nipples and caps to scrub the interiors of the bottles, nipples and caps, liquid-supply means for supplying liquid to the interiors of the bottles, nipples and caps during the scrubbing operation, means at the washing station for spraying the interiors and exteriors of the bottles, nipples and caps, and means at the nipple and cap-applying station for removing nipples from the plate and fitting a nipple on each bottle, means for removing caps from the plate and fitting a cap on each bottle over the nipple thereon, and means located intermediate of the rinsing station and nipple and cap-applying station for causing a closing of the bottom opening in each bottle before the bottles reach the filling station.

2. In a bottle-filling apparatus, a conveyor for a basket containing a plurality of bottles to be filled, nipped and capped, said basket holding a support for a plurality of nipples and caps, each of the bottles having a bottom opening, means for simultaneously cleansing the interior and exterior of each bottle, nipple and cap, means for thereafter rinsing the bottles, nipples and caps, means for closing the bottom openings in the bottles, means for filling the bottles, means for applying a nipple to each bottle, and means for applying a protective cap on each bottle over the nipple thereon.

3. In an apparatus as provided for in claim 2, wherein the bottle-cleansing means includes rotated bristled elements entering the bottles, nipples and caps to scrub the interiors thereof, the means for filling the bottles being entrant into the bottles from the tops thereof, and the means for applying the nipples and caps being effective

to force the nipples and caps from off their support preparatory to applying them to the bottles.

4. In a bottle-filling apparatus, a receptacle in the form of a basket holding a plurality of bottles, a plate in the basket over the tops of the bottles, said plate having a plurality of apertures in which nipples and caps are seated, plunger means effective to force nipples out of the apertures in the plate and fit the same on the tops of the bottles in the basket, and other plunger means effective to force caps out of the apertures in the plate and fit the same on top of the bottles over the nipples thereon.

5. In a bottle-filling apparatus, a receptacle containing bottles, a flat, apertured support in the receptacle above the bottles, each bottle having an opening in its bottom, washing means entrant through said openings to wash the interiors of the bottles, the support carrying nipples and caps, a filling station to which the receptacle is carried, means effective to close the openings in the bottoms of the bottles before the bottles reach the filling station, means at the filling station for filling the bottles through the tops of the same, and means for thereafter applying a nipple to the top of each bottle and a cap over each nipple, the nipples and caps being removed from the apertured support by the means which applies them to the bottles.

6. In a bottle-filling apparatus, means for transporting a bottle carrier containing bottles and a nipple and cap support, means for simultaneously internally and externally cleansing the bottles, nipples and caps, means for thereafter rinsing the bottles, nipples and caps, means for filling the bottles, means for applying the nipples to the bottles and then applying the caps to the bottles over the nipples.

7. In a bottle-filling apparatus as provided for in claim 6, wherein the cleansing means consists of rotated brushes entering into the bottles, nipples and caps; the rinsing means comprising spray jets disposed around the bottle carrier; the nipple and cap-applying means including plungers operative to move the nipples and caps from their support and apply them to the bottles.

8. In a bottle-filling apparatus, a basket containing a plurality of bottles, said basket also containing an apertured plate with nipples and caps fitted into its apertures, means for engaging said plate and elevating it above the basket, means for shifting the plate to vertically align the nipples in it with the bottles below it, plunger means operative to then force nipples downwardly and out of the apertures in the plate and apply them to the tops of the bottles, the plate-shifting means being effective to then shift the plate to a position to vertically align the caps with the bottles, and plunger means operative to force the caps downwardly and out of the apertures in the plate and apply them to the tops of the bottles over the nipples thereon.

9. In a bottle-filling apparatus, means for holding a plurality of bottles, each of the bottles being provided with a bottom opening, means for cleansing the bottles by fluid directed upwardly into them through their bottom openings, filling means for the bottles, said filling means being operative to fill the bottles through the tops of the same, and means for closing the bottom openings in the bottles before the bottles are presented to the filling means.

10. In a bottle-filling apparatus, a receptacle for holding bottles, a plate fitted in the receptacle above the bottles, said plate being apertured, nipples and caps fitted in and extending upwardly from the apertures in the plate, and plunger means for removing the nipples from the plate and fitting them on the bottles located below the plate, and other plunger means for thereafter forcing the caps out of the apertures in the plate and fitting them on the bottles over the nipples thereon.

11. In a bottle-filling apparatus, a receptacle for holding a plurality of bottles in an upright position, a sup-

port in the receptacle for holding a plurality of nursing nipples and caps, said support being positioned in the receptacle above the bottles, means for lifting the support out of the receptacle and shifting it horizontally to vertically align the nipples in the support with the mouths of the bottles, plunger means for forcing the nipples out of the support and fitting them on the tops of the bottles, the shifting means being operative to shift the support to vertically align the caps thereon with the tops of the bottles, and plunger means for forcing the caps out of the support and fitting them on the bottles over the nipples thereon.

12. In a bottle-filling machine, an open-bottom receptacle for holding a plurality of bottles, the bottles each having an opening in their bottoms, means for supporting nipples and caps in the receptacle above the bottles, rotating brushes inserted upwardly through the open bottoms of the bottles to cleanse the interior of the bottles and other brushes inserted into the nipples and caps to cleanse the interiors of the same simultaneously with the cleansing of the interiors of the bottles.

13. In an apparatus for cleansing and filling nursing bottles, an open-mesh basket for holding a plurality of bottles in an upright position with their mouths disposed upwardly, each of the bottles having an opening in its bottom and an integrally-attached closure plug for said opening, conveying means for transporting the basket to a cleansing station and to a rinsing station for the successive cleansing and rinsing of the bottles by fluid directed into them through the openings in their bottoms, filling means to which the basket is transported after the bottles have been rinsed, said filling means being operative to fill the bottles through their mouths, and means for fitting the closure plugs into the openings in the bottoms of the bottles after the basket leaves the rinsing station and before it is presented to the filling station.

14. In an apparatus as provided for in claim 13, wherein the filling means is operative to fill the bottles through the mouths of the same, said filling means including feed tubes entering into the bottles, and the means for causing the insertion of the plugs into the openings in the bottoms of the bottles consists of a roller against which the plugs contact during travel of the basket from the rinsing means to the filling means.

15. In a bottle-filling apparatus, a cleansing station, a rinsing station, a filling station and a nipple-applying and capping station, a basket containing bottles, nipples and caps, conveying means for successively presenting the

basket to the stations in the order above named and with a halt of the basket at each of the stations, means at the cleansing station for entering openings in the bottoms of the bottles and brushing and spraying the interiors of the bottles, nipples and caps in the basket during the halt of the basket at said station, means at the rinsing station for liquid-spraying the bottles, nipples and caps during the halt of the basket at that station, means at the filling station for depositing a predetermined quantity of liquid food in each bottle during a halt of the basket at the filling station, means at the nipple-applying and capping station for first applying a nipple on the top of each bottle in the basket and then applying a cap thereover, and sterilizing means for the bottles, nipples and caps.

16. In a bottle-filling apparatus as provided for in claim 15, wherein the washing and rinsing operations are performed by fluids entrant into the bottles through the openings in the bottoms of the bottles, and wherein the filling of the bottles is performed by filler pipes entering into the bottles through the mouths of the bottles, and means for closing the bottom openings in the bottles prior to the filling of the same.

17. In a bottle-filling apparatus, a basket for holding a plurality of bottles in an upright position, clips in the basket for engaging the bottles to hold the same upright, each of the bottles having a centrally-located opening in its bottom and having a flexible flap provided with a closure plug fitting said opening, means for conveying the basket from one treating station to another station, and means intermediate of the stations for contacting the flaps and causing the plugs carried thereby to be inserted in the bottom openings in the bottles.

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