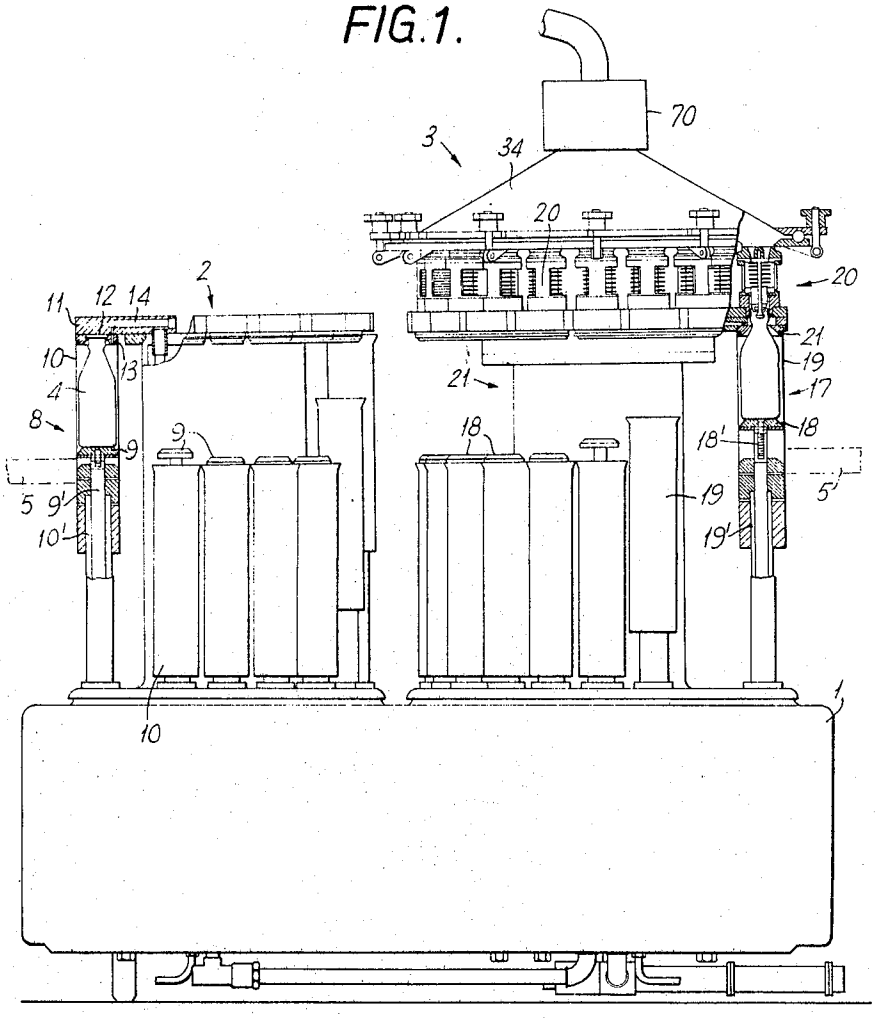
Dec. 2, 1969 J. A. PAVEY 3,481,109

CONTAINER STERILISING AND FILLING APPARATUS

Filed Dec. 5, 1967 5 Sheets-Sheet 1

FIG.1.



CONTAINER STERILISING AND FILLING APPARATUS

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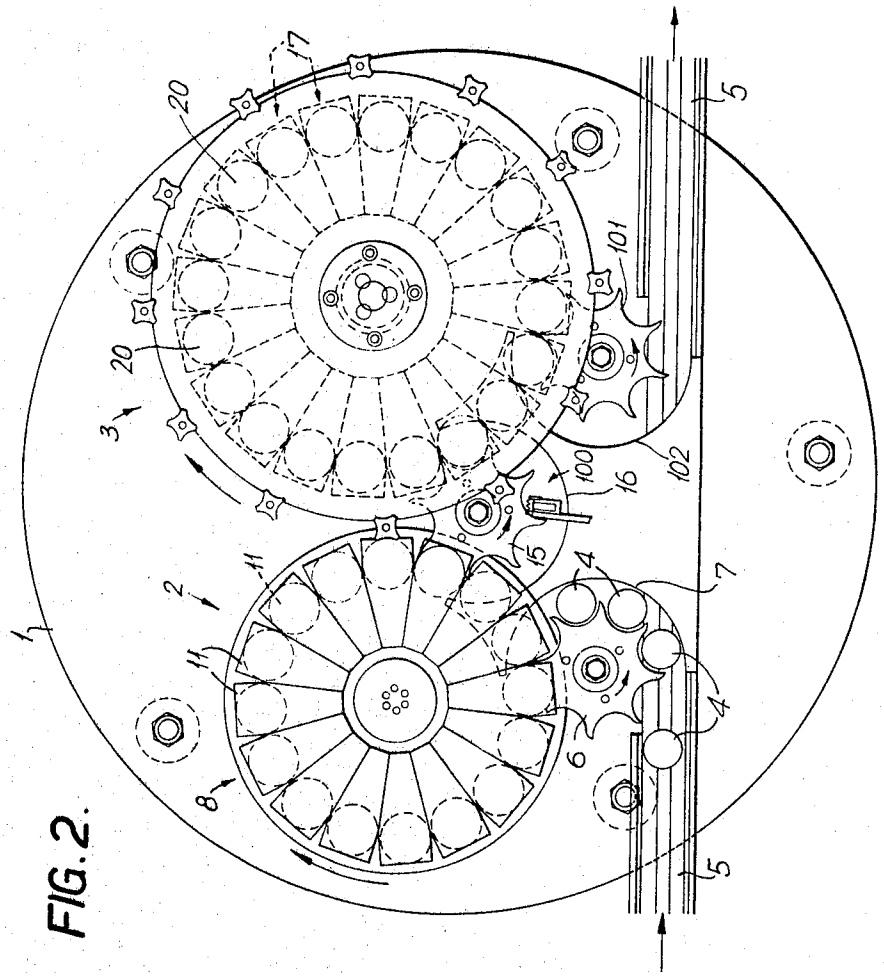

FIG. 2.

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CONTAINER STERILISING AND FILLING APPARATUS

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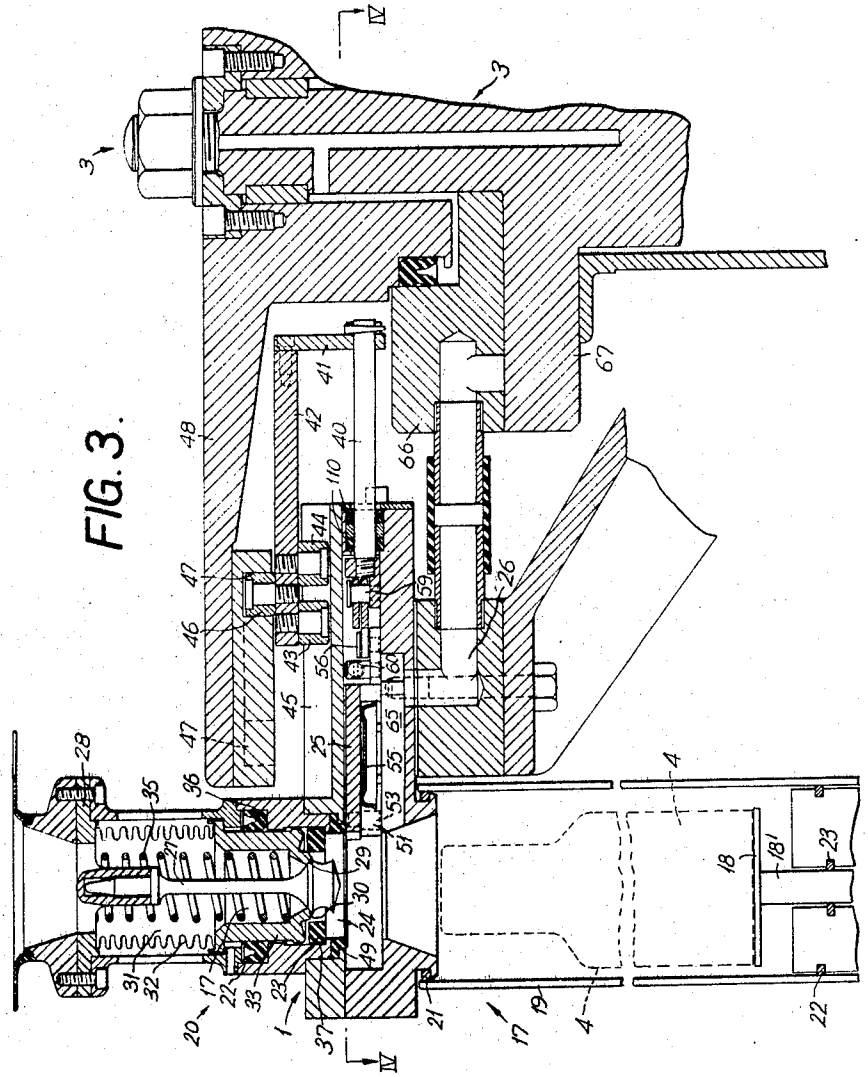
FIG. 3.



CONTAINER STERILISING AND FILLING APPARATUS

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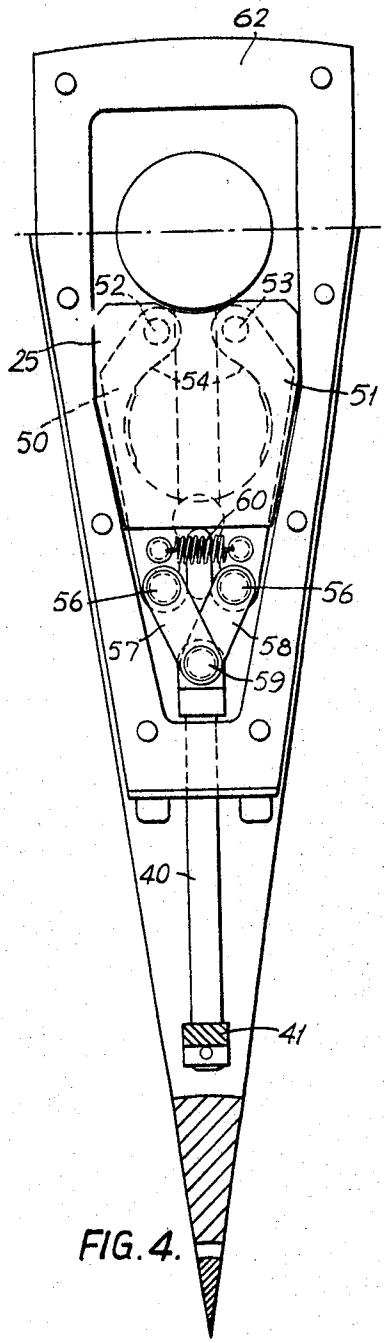

FIG. 4.

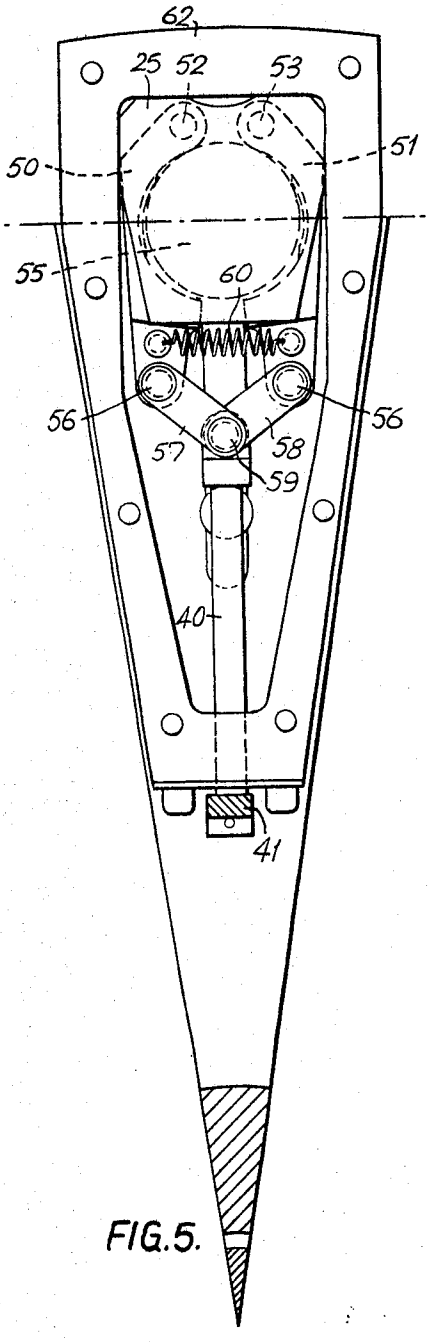

FIG. 5.

CONTAINER STERILISING AND FILLING APPARATUS

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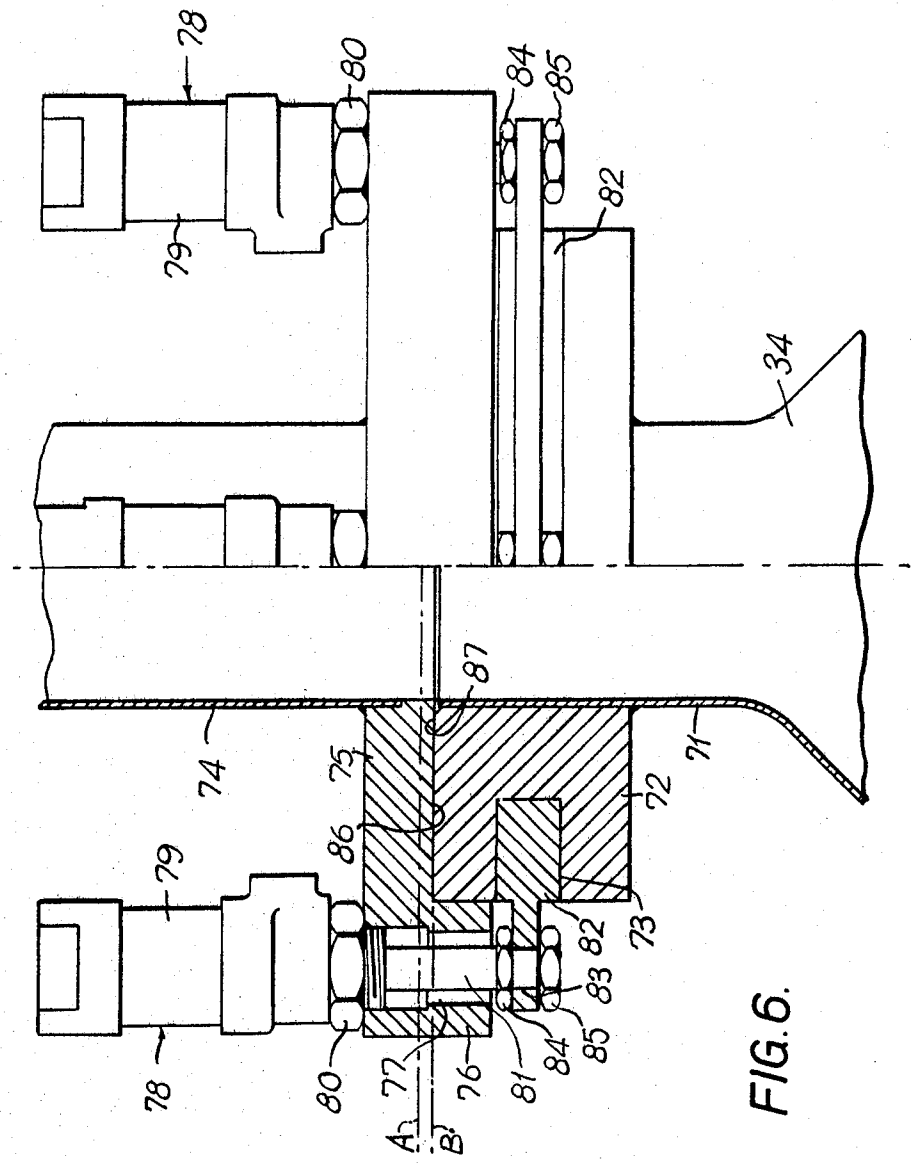

FIG. 6.

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CONTAINER STERILISING AND FILLING APPARATUS

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Claims priority, application Great Britain, Dec. 8, 1966, 55,072/66, 55,073/66

Int. Cl. B67c 7/00

U.S. Cl. 53—167 15 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for sterilising and filling a container, e.g. bottle, comprising a plurality of stations each of which includes a pedestal, a sleeve, a filling valve and a barrier member for isolating the filling valve from steam introduced into the sleeve to sterilise the bottle. The sleeve is movable to allow the bottle to be raised within the sleeve to engage the filling valve. The barrier member has associated with it jaws for gripping a bottle closure device on the bottle when it arrives at the station and for holding the closure device during sterilisation and for releasing the closure device on to the bottle neck after sterilisation and filling of the bottle.

This invention relates to apparatus for sterilising and filling a container in which the sterilising and filling is carried out at the same station.

Apparatus for sterilising and filling a container may include a filling valve which, when opened, delivers material from a reservoir into a previously sterilised container. When sterilising the container, it is usually desirable to isolate the filling valve from the sterilising medium as, otherwise, the sterilising medium might contact and penetrate the filling valve and adulterate the material in the reservoir.

It is an object of the present invention to isolate the filling valve for sterilising medium and from atmospheric contamination.

According to the present invention there is provided apparatus for sterilising and filling a container, comprising means for sterilising a container at a station, a filling valve operable to fill the container at the station from a position above the container, and a barrier member movable in a substantially horizontal direction from one position between the container and the filling valve in which it isolates the filling valve for sterilising medium during the container sterilising operation and from atmospheric contamination during loading and unloading of the container to and from the station, to another position in which it allows the container to be filled from the filling valve.

The barrier member may be associated with means for holding a container closure device for sterilisation by the sterilising medium during the container sterilising operation. The closure device may be fed to the barrier member along a path separate from that followed by the container in arriving at the station. Alternatively, the closure device may be carried by the container as it arrives at the station and in this case the closure device would be removed from the container by the means associated with the barrier member, before sterilisation.

Embodiments of the present invention will now be described, by way of example with reference to the accompanying drawings in which:

FIGURE 1 illustrates an elevational view of an apparatus for preheating, sterilising and filling a bottle with milk;

FIGURE 2 illustrates a plan view of the apparatus illustrated in FIG. 1, with parts removed for the sake of clarity;

FIGURE 3 illustrates a sectional view in elevation of one of the sterilising and filling stations included in the apparatus illustrated in FIG. 1;

FIGURE 4 is a sectional view taken on the line IV—IV in FIG. 3, illustrating parts in a first operational position;

FIGURE 5 is a sectional view similar to that of FIG. 4 but with parts in another operational position;

FIGURE 6 illustrates an elevational view, partially in section of a portion of the apparatus illustrated in FIG. 1.

In FIGURES 1 and 2 there is illustrated an apparatus for preheating, sterilising and filling bottles. The apparatus is intended for filling bottles with milk but is suitable for filling the bottles with other liquids, such as, for example, liquid pharmaceuticals beverages or clear soups.

The apparatus comprises a base **1** on which is mounted a rotary preheating device **2** and a rotary, sterilising and filling device **3**.

Bottles **4**, to be preheated, sterilised and filled are fed along a conveyor **5** to a star-wheel **6**, which when rotated loads bottles, in cooperation with the semi-circular guide **7**, in series on to the rotary preheat device **2**. The bottles **4** are placed one in each of a plurality of preheat stations **8**, in sequence.

Each preheat station **8** includes a pedestal **9** carried on the upper end of a vertically reciprocable shaft **9'** driven in its vertical movement by means contained within the base **1**; a sleeve **10** carried by a vertically reciprocable shaft **10'** coaxial with the shaft **9'** and driven in its vertical movement by means contained within the base **1**; and a head **11**. The means for driving the shafts **9'**, **10'** may be stationary cam tracks on which cam followers associated with the shafts bear, or, alternatively the shafts **9'**, **10'** may be driven by pneumatic means.

After a bottle **4** has been placed on a pedestal **9**, the pedestal **9** is raised by its shaft **9'** so that the mouth of the bottle is brought into forced engagement with a seal **12** which seals the bottle. The sleeve **10** is then raised, about the bottle, until its upper end cooperates with a seal **13**. The sleeve **10** is also sealed at its lower end.

Steam is then introduced, through a passage **14**, into the space outside the bottle **4** within the sleeve **10**. The steam serves to heat the bottle **4** so that upon subsequent sterilisation of the interior of the bottle by steam there is little or no condensation of the sterilising steam within the bottle.

After the bottle has been preheated the sleeve **10** and pedestal **9** are lowered by the time the bottle arrives at a further star-wheel **15** which carries the bottle, in cooperation with a circular arcuate guide **16**, away from the preheat device **2** to the sterilising and filling device **3**. A device **100** located above the star wheel **15**, places a closure device on the neck of each bottle as it passes beneath the device **100**. The closure device is carried forward on the bottle.

The sterilising and filling device includes a plurality of stations **17** similar in certain respects to the stations **8** of the preheat device **2**.

Each station **17** includes a pedestal **18** carried on the upper end of a vertically reciprocable shaft **18'** driven in its vertical movement by means disposed within the base **1**; a sleeve **19** carried by a vertically reciprocable shaft **19'** coaxial with the shaft **18'** and driven in its vertical movement by means disposed within the base **1**; and a head **20**. The shafts **18'**, **19'** may be driven by a stationary cam track on which cam followers associated with the shafts bear. Alternatively the shafts may be driven by pneumatic means. The pedestals **18**, sleeves **19** and heads **20** are rotatable in unison about a vertical axis by means disposed within the base **1**. The bottles are placed, by the star-wheel **15**, one on each of the pedestals **18** when the sleeve **19** around the pedestal **18** receiving a bottle is in its lowered position. The sleeve **19** is then raised to its uppermost position (illustrated in FIG. 3) in which the upper end of the sleeve **19** cooperates with a seal **21**. The lower end of the sleeve **19** slides over a seal **22** and the vertical shaft of the pedestal **18** slides within a seal **23**.

Each head **20** includes a filling valve **24**, a barrier member **25** slidably mounted therein for movement in a substantially horizontal direction, and a conduit **26** for the passage of steam and air.

The filling valve **24** is located above the plane of the barrier member **25** and is generally coaxial with the pedestal **18** and sleeve **19**. The filling valve **24** includes a vertical steam **27** connected to an upper housing part **28** of the head. The stem **27** has a frusto-conical face **29** at its lower end which engages a valve seat **30**.

The stem **27** is mounted in a vertical passage **31** which is formed in part in the upper housing part **28**, in part by a bellows **32**, and in part by a valve sleeve **33**. The valve seat **30** is formed on the lower extremity of the valve sleeve **33** and the arrangement of valve seat **30** and the stem face **29** is such that upon upwards movement of the valve sleeve **33** the lower end of the passage **31** is opened for flow of liquid between the valve seat **30** and face **29**. The passage **31** is open at its upper end to the interior of a sterile reservoir **34** which rotates with the heads **20**.

A spring **35** located coaxially with the stem **27** within the bellows **32** acts between the upper housing part **28** and the valve sleeve **33** to urge the sleeve **33** downwards into sealing engagement with the valve face **30** of the valve stem **27**.

The sleeve **33** slides within a sealing ring **36**. A further sealing ring **37** is positioned below the valve sleeve **33** and rests on a ledge **38**.

Disposed on the underside of the barrier member **25** are two jaws **50**, **51** of a container closure gripping device. The jaws **50**, **51** are pivotally connected to the barrier member **25** at pivots **52**, **53** respectively. Each jaw **50**, **51** has an arcuate inner profile in plan (see FIGS. 4 and 5), as indicated at **54**, so shaped that a container closure device, for example, a bottle cap **55**, can be held between them.

The ends of the jaws **50**, **51** remote from the pivots **52**, **53** are pivotally connected at **56** to links **57**, **58** and the links **57**, **58** are connected through a common pivot **59** to a connecting rod **40**.

A tension spring **60** biases the jaws **50**, **51** towards one another.

The connecting rod **40** extends towards the axis of rotation of the sterilising and filling device **3**, through seals **110** carried by the head. The seals **110** serve to isolate the space within the head and sleeve from the atmosphere whilst allowing movement of the rod **40** into and out of this space. The end of the rod **40** nearer the axis of rotation is connected by a vertical connecting link **41** to an upper rod **42** which is located above and parallel to the rod **40**. The upper rod **42** carries a cam follower in the form of two rollers **43**, **44** extending into a radially extending slot **45** in the head and a roller **46** projecting into a cam track **47** in the underside of a member **48** which is stationary and does not rotate with the heads **20**. The rollers **43**, **44** and slot **45** constrain the upper rod **42** for movement in a radial direction and the cam track **47** and roller **46** serve to move the upper rod **42**, link **41** and rod **40** to and fro along the radius—in accordance with the predetermined form of the cam track **47**, as the head rotates relative to the member **48**. The cam track **47** is continuous and varies, along its length, in radial distance from the axis of rotation, whereby the barrier member **25** may be in the position illustrated in FIG. 3 or in a position in which it extends beneath the filling valve and the jaws **50**, **51** may be closed or open when the barrier member is in its position beneath the filling valve.

As the rod **40** is moved radially outwards from its position illustrated in FIG. 4 the barrier member **25** is moved in unison with the rod **40** through the links **57**, **58**, jaws **50**, **51** and pivots **59**, **56**, **52**, **53**. The barrier member **25** is guided in such sliding movement by guides formed in the head. When the barrier member **25** is located beneath the filling valve the radially outer end of the barrier member **25** engages a stop **62** which prevents further radially outwards movement of the barrier member **25**. Further radially outwards movement of the rod causes the jaws **50**, **51** to be opened in opposition to the spring **60**. An annular seal **49** formed of a material which is not detrimentally affected by the elevated temperatures to be encountered or by sliding movement of the barrier member **25** over it is retained in the head coaxially with the filling valve and has a start which extends downwardly so as to engage the upper surface of the barrier member **25** when the latter is disposed beneath the filling valve.

The passage **26** extends from a space **65** beneath the path of the barrier member **25** to a head member **66** which engages and rotates, in unison with the heads **20**, relative to the face of a lateral projection **67** from the non-rotating central portion of the apparatus. The lateral projection **67** has formed in it passages (not shown) leading to parts (not shown) in the face thereof engaging the opposed face of the member **66**. Steam is supplied to one of the passages and vacuum is applied to the other of the passages in the lateral projection **67**. The head member **66** and lateral projection **67** function as a rotary valve controlling application of steam and vacuum to the passage **26** at appropriately timed intervals.

The vacuum may be created by any convenient means such as, for example, a vacuum pump or a steam ejector.

As mentioned above, the reservoir **34** rotates with the heads **20**. Since it is necessary that the liquid, for example milk, to be placed in the containers should be maintained in a sterile condition, the liquid must be supplied to the reservoir along a path isolated from the atmosphere. It is therefore necessary to provide a connection between a non-rotating reservoir and the rotating reservoir **34**. FIGURE 6 illustrates such a coupling which is disposed within the casing **70** illustrated in FIG. 1.

The upper extremity of the reservoir **34** is provided with a neck **71** to which is affixed an annular collar **72**, the upper surface of which is coplanar with the upper extremity of the neck **71**. The collar has a circumferential groove **73**.

At end portion **74** of a supply conduit is disposed with its axis aligned with that of the neck **71** and has secured to its end a flange **75**. The flange **75** has a skirt **76** which extends downwardly as a sliding fit around the periphery of the collar **72** above the groove **73**.

The skirt **76** has formed in it four apertures **77** uniformly disposed about the common axis of the neck **71** and conduit end portion **74** and the axis of the apertures **77** are parallel to the aforesaid common axis.

Four fluid pressure-operated piston-cylinder devices **78** are provided, the cylinder parts **79** of which are mounted on the flange **75** by screw-threaded engagement in the apertures **77**. Lock nuts **80** are provided. The piston parts

of the devices 78 have rods 81 which project from the cylinder parts 79 through the respective apertures 77. A split ring 82, located in the groove 73 in the collar 72 has four apertures 83 therein thruogh each of which one of the piston rods 81 extends. Each piston rod 81 is secured to the split ring 82 by two nuts 84, 85.

The flange 75 has a radial face 86 engageable in a sealing manner with a corresponding face 87 on the collar 72. One of the faces 86, 87 has bonded to it a disc of Ulon to prevent metal to metal contact of the two faces.

When the four piston cylinder devices 78 are operated in a contracting manner, the faces 15, 16 are biased into forced surface 86 to surface 87 engagement and leakage of liquid between the faces 86, 87 from the conduit end 74 is prevent but rotation of the reservoir 34 and neck 71 and collar 72 relative to the conduit end 74 and flange 75 is possible. During this relative rotational movement the surface 87 slides over the surface 86 and surfaces of the groove 73 slide over surfaces of the split ring 82.

To clean the coupling, the piston cylinder devices 78 are operated in an extending manner which causes the faces 86, 87 to move apart by a small distance as indicated by the lines A and B. Cleaning fluid can then be passed through the coupling so as to leak from the conduit end 74 radially outwardly between the faces 86, 87 thereby cleaning them. In order to allow fluid to escape from the radially outer periphery of the faces 86, 87, the radially inner cylindrical surface of the skirt 76 is provided with grooves (not shown). Sterilisation of the coupling can be effected in a similar manner.

The seal between the conduit end 74 and the neck 71 is re-created by operating the piston-cylinder units in a contracting manner.

In operation of the apparatus, a series of bottles 4 are supplied along the conveyor 5 and, in single succession, are engaged by the star-wheel 6 and carried round thereby, guided by the guide 7 and placed one on each of the pedestals 9. After passing away from the star-wheel 5, the sleeve 10 associated with the pedestal 9 on which a bottle 4 has just been placed, is raised so that its upper end engages the seal 13. As the preheating device 2 continues to rotate, the pedestal 9 is raised so that the neck of the bottle 4 engages the seal 12 and the interior of the bottle 4 is isolated from the now enclosed interior of the sleeve 10. After the isolation of the interior of the bottle, steam is introduced into the enclosed interior of the sleeve 10 through the passage 14. No steam enters the isolated interior of the bottle 4. It is arranged that the rate of rotation of the pre-heat device is such that before the bottle has to leave the pre-heat device 2, the bottle 4 is sufficiently heated that upon subsequent introduction of steam into the bottle there is substantially no condensation within the bottle.

As the individual bottles 4 approach the star-wheel 15, each sleeve 10 is lowered, after venting of the steam. The pedestal 9 is then lowered and the bottle 4 is then engaged by the star-wheel 15 and is moved, whilst guided by the guide 16, towards the sterilising and filling device 3. Whilst being moved by the star wheel 15, a bottle 4 has placed on its neck a cap 55 from the cap feed device 100.

The bottle 4 with a cap 55 thereon is placed by the star-wheel 15 on one of the pedestals 18 of the rotating sterilising and filling device 3. As the station 17 with the newly preheated bottle 4 thereon moves away from the star-wheel 15, the sleeve 19 is raised so that its upper end engages the seal 21. The pedestal 18 is then raised. The barrier member 25 is, at this time disposed beneath the filling valve and it is in this position at all times when the sleeve 19 is lowered away from the seal 21, so that the underside of the filling valve is isolated from the atmosphere by the engagement of the barrier member 25 with the seal 49.

The pedestal 18 is raised until the cap 55 on the bottle engages the underside of the barrier member 25. The jaws 50, 51 are at this time, open because the rod 40 has been moved fully radially outwards under the control of the cam track 47. When the cap 55 has been brought up to the underside of the barrier member 25 the connecting rod 40 moves radially inwards, under the control of the cam track 47, through a small distance to allow the jaws 50, 51 to close on and grip the cap 55 without radially inwards movement of the barrier member 25.

The pedestal 18 with the bottle thereon is then lowered and the cap stays behind in the jaws 50, 51. At this stage in the rotation of the head 20 and hence of the member 66 relative to the lateral projection 67, the passage 26 has applied to it a vacuum. Since the passage 26 is in open communication through the space 65 with the interior of the sleeve, which includes the interior of the bottle because the interior of the bottle is not isolated. The interior of the sleeve is partially evacuated. Continued rotation of the head 20 moves the passage in the member 66 past the vacuum port in the lateral projection 67 to the steam port in the lateral projection 67.

In passing between the two ports the partial vacuum within the sleeve 19 is maintained. Steam is introduced into the interior of the sleeve 19 and bottle 4. Because of the partial vacuum, steam is able to contact and sterilise all parts of the interior and neck of the bottle and of the cap 55 without the masking effect which the presence of air at atmospheric pressure would otherwise create. The bottle and cap are thereby sterilised and because the bottle 4 is preheated there is substantially no condensation of the sterilising steam within the bottle 4.

The sterilising steam is prevented from reaching the underside of the filling valve by the cooperation of the seal 49 with the barrier member 25.

If the seal 49 should fail when the interior of the sleeve 19 is partially evacuated, the seal 26 would prevent inflow of atmospheric air. If the seal 49 should fail when the interior of the sleeve contains sterilising steam, the seal 49, being of the U-sectional form illustrated, allows escape to the atmosphere of pressure steam in the cavity above the barrier member, so that a build up of steam pressure on the underside of the filling valve is prevented. Thus, even if the seal 49 should fail, contamination and adulteration of the liquid to be introduced into the bottle 4 is prevented.

The steam supply through the passage 26 is subsequently cut off and the passage 26 is vented through the lateral projection 67.

The connecting rod 40 is then moved radially inwards, under the control of the cam track 47, and, because movement of the jaws 50, 51 towards one another is prevented by the presence of the cap 55 between the jaws, the barrier member 25 is moved radially inwards to its position illustrated in FIG. 4.

The pedestal 18 is then raised to a position in which the neck of the bottle 4 not only engages the seal 37 but lifts it upwardly into engagement with the sleeve 33 and moves the sleeve 33 upwardly, against the spring 35, so that the valve seat surface 30 moves away from the stem surface 29 so that liquid in the valve sleeve 33 and bellows 32 flows downwardly into the bottle. Liquid flowing out of the sleeve 33 and bellows 32 is, of course, replenished by flow of liquid out of the reservoir 34 which in turn is replenished by flow from a further reservoir through the conduit end 74 and neck 71.

The pedestal is then lowered and the spring 35 causes the valve sleeve 33 and seal 37 to follow the neck downwardly whilst maintaining a seal with the neck of the bottle thereby preventing spillage of liquid to the exterior of the bottle.

Downwards movement of the valve sleeve 33 is terminated by engagement of the valve seat surface 30 with the stem surface 29 which also prevents further downwards flow of liquid. It will be realised that because the stem 27 extends beneath the stem surface 29 into the neck of the bottle 4, the volume of liquid in the bottle is slightly less than the volume of the bottle.

The pedestal **18** is lowered further until the upper end of the neck of the bottle is out of the path of the barrier member **25** and cap **55**. The barrier member **25**, with the cap **55** still gripped in the jaws **50**, **51**, is moved radially outwards to a position in which the barrier member **25** is beneath the filling valve and contacts the stop **62**. The pedestal **18** is then raised. It will be realised that the space within the neck above the liquid in the bottle now contains residual steam and a little residual, sterilised air, assuming that the vacuum previously created was not a total vacuum. The neck of the bottle is brought up into forced engagement with the cap by further upwards movement of the pedestal **18**. The connecting rod **40** is then moved further radially outwards so that the jaws **50**, **51** move apart and release their grip on the cap **55**, the barrier member **25** being in engagement with the stop **62** at this time.

The residual steam in the space beneath the cap **55**, and within the bottle is condensing and hence the cap **55** is held on the bottle by a partial vacuum. The pedestal **18** and sleeve **19** are then lowered, before arrival of the station **20** at the star-wheel **101** which moves the bottle **4**, under the guidance of the guide **102**, back on to the conveyor **5** to a station (not shown) at which the cap is crimped on to the neck of the bottle. The crimping station need not be provided if other means are provided for securing the cap to the bottle.

Thus, at the same station, the bottle and cap are sterilised, the bottle is filled with liquid and the bottle is capped, all these operations occurring in a sterile atmosphere.

Whilst it has been stated above in relation to the specific embodiments that bottles are the containers to be sterilised and filled, it is to be understood that the containers may be of other form, such as, for example, cans.

It is also to be understood that the terms "filling," "filled" or the like, are not to be construed as meaning that the container is to contain liquid or other material of a volume equivalent to the volume of the container. Rather, the terms are to be construed as meaning the introduction into the container of material having a volume which may be less than that of the container, in which case the container is not, literally speaking, filled.

Whilst the material to be introduced into the containers is described above as liquid, and in particular milk, the invention may be embodied in apparatus for sterilising and filling a container with materials other than liquids. Such other materials may, for example, be solids, for example, solids in powder, particulate or granular form. Whilst the invention has been described in embodiments which are continuously operating and rotary acting, it is to be understood that the invention may be embodied in other arrangements.

I claim:

1. Apparatus for sterilising and filling a container comprising:
- a station;
- means adapted to sterilise a container at the station;
- a filling valve adapted to fill the container at the station; and
- a barrier member adapted to be moved in a substantially horizontal direction from a first position between the container and the filling valve in which it isolates the filling valve from the sterilising medium during the container sterilising operation and from atmospheric contamination during loading and unloading of the container to and from the station, to a second position in which it allows the container to be filled from the filling valve.

2. Apparatus as claimed in claim **1**, wherein said station includes:
- a pedestal adapted to support a container to be sterilised and filled;
- a sleeve adapted to be moved between positions in one of which it allows loading and unloading of a container on and off the pedestal and in another of which it serves in part to isolate the container from the atmosphere; and
- means adapted to introduce sterilising medium into the space within the sleeve.

3. Apparatus as claimed in claim **2**, including:
- means adapted to evacuate the space within the sleeve prior to introduction of the sterilising medium.

4. Apparatus as claimed in claim **2**, including:
- means adapted to vent the sterilising medium from the space within the sleeve after sterilisation of the container; and
- means adapted to move the barrier member into its said second position after venting of the sterilising medium, and to move the barrier member into its first position prior to unloading of the container.

5. Apparatus as claimed in claim **1**, including:
- means adapted to hold a container closure device;
- said closure device holding means being associated with said barrier member.

6. Apparatus as claimed in claim **5**, wherein:
- said closure device holding means is adapted to grip and hold a container closure device disposed on a container upon arrival at said station and subsequently to release the container closure device on to the container.

7. Apparatus as claimed in claim **6**, wherein said closure device holding means includes:
- two members each adapted to engage a portion of the periphery of a closure device; and
- means adapted to move the two members apart to release the closure device.

8. Apparatus as claimed in claim **7**, wherein said station includes:
- a pedestal adapted to support a container to be sterilised and filled;
- a sleeve adapted to be moved between positions in one of which it allows loading and unloading of a container on and off the pedestal and in another of which it serves, in part, to isolate the container from the atmosphere; and
- means adapted to introduce sterilising medium into the space within the sleeve.

9. Apparatus as claimed in claim **7**, including:
- means adapted to evacuate the space within the sleeve prior to introduction of the sterilising medium.

10. Apparatus as claimed in claim **9**, including:
- means adapted to vent the sterilising medium from the space within the sleeve after sterilisation of the container; and
- means adapted to move the barrier member into its said second position after venting of the sterilising medium, and to move the barrier member into its first position prior to unloading of the container.

11. Apparatus as claimed in claim **10**, wherein:
- said station constitutes one of a plurality of similar stations disposed about and rotatable in unison about a vertical axis.

12. Apparatus as claimed in claim **11**, wherein the means for moving each barrier member includes:
- a stationary cam track; and
- cam follower means engaging the cam track and connected to the barrier member.

13. Apparatus as claimed in claim **12**, wherein:
- said cam follower means is connected to the said two closure device engaging members;
- said two closure device engaging members are pivotally connected to said barrier member;
- the arrangement being such that initial movement in one direction of said cam follower means causes movement of the barrier member to its first position and that further movement in the said one direction of the cam follower means causes the two clo-

sure device engaging members to release a container closure device.

14. Apparatus as claimed in claim **1**, including:

a pre-heat station;

means adapted to load containers in series on said pre-heat station;

means adapted to unload containers from said pre-heat station and to load pre-heated containers in series on said sterilising and filling station;

means adapted to place a container closure device on each container as it is moved from the pre-heat station to the sterilising and filling station; and

means adapted to unload filled containers from the sterilising and filling station.

15. Apparatus as claimed in claim **14**, including:

means adapted to secure a container closure device to the container after the container with the closure device thereon is unloaded from the sterilising and filling station.

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53—109, 282; 141—85