Aug. 31, 1943. J. E. WOLLENWEBER 2,328,372

MECHANISM FOR AND METHOD OF CHARGING CONTAINERS WITH LIQUID

Filed Nov. 25, 1938 3 Sheets-Sheet 1

FIG. 1.

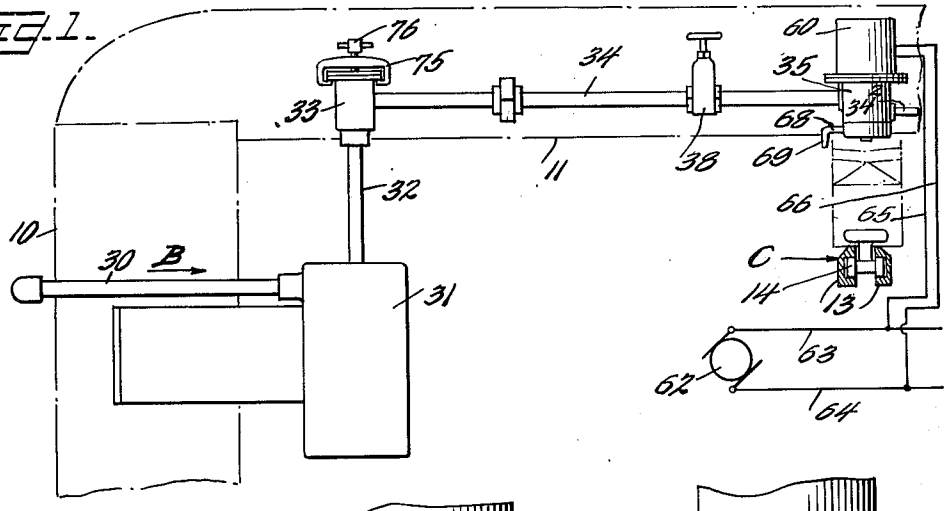


FIG. 2.

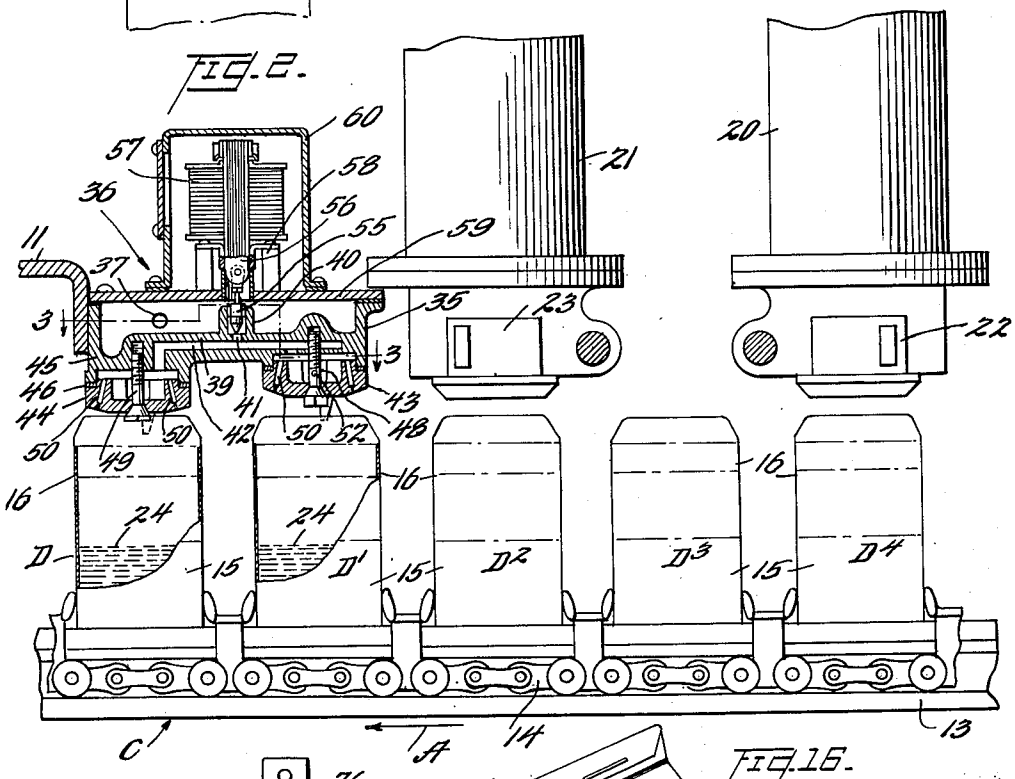


FIG. 15.

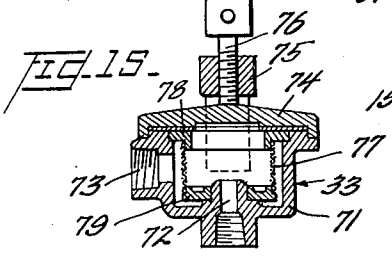
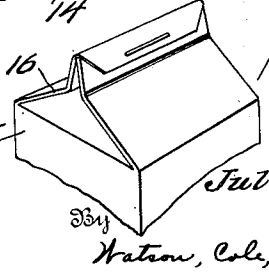


FIG. 16.



Inventor

Julius E. Wollenweber,

By Watson, Cole, Grindle & Watson

Attorneys

Aug. 31, 1943. J. E. WOLLENWEBER 2,328,372

MECHANISM FOR AND METHOD OF CHARGING CONTAINERS WITH LIQUID

Filed Nov. 25, 1938 3 Sheets-Sheet 2

FIG. 3.

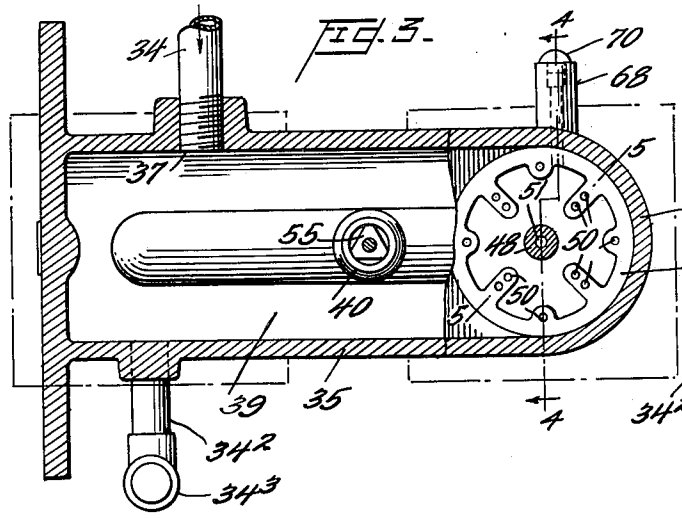


FIG. 17.

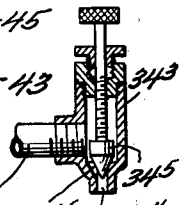


FIG. 8.

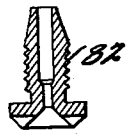


FIG. 4.

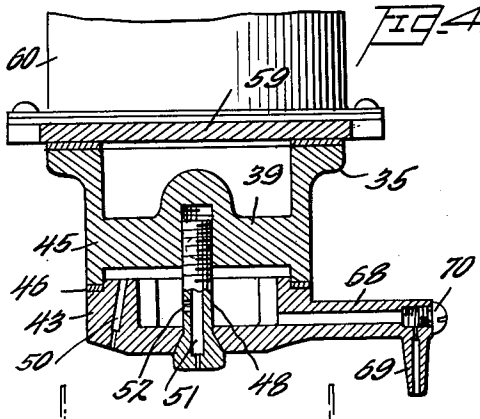


FIG. 5.

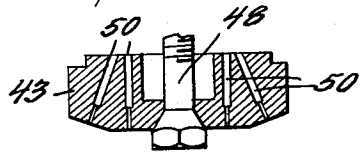
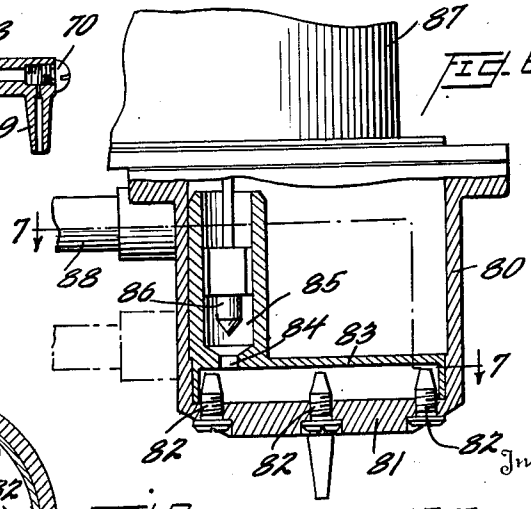


FIG. 6.



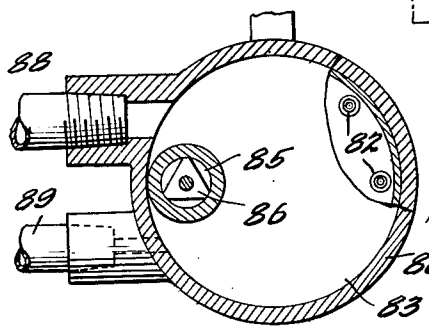


FIG. 7.

Inventor

Julius E. Wollenweber,

By Watson, Cole, Grindle & Watson

Attorneys

Aug. 31, 1943. J. E. WOLLENWEBER 2,328,372

MECHANISM FOR AND METHOD OF CHARGING CONTAINERS WITH LIQUID

Filed Nov. 25, 1938 3 Sheets-Sheet 3

FIG. 9.

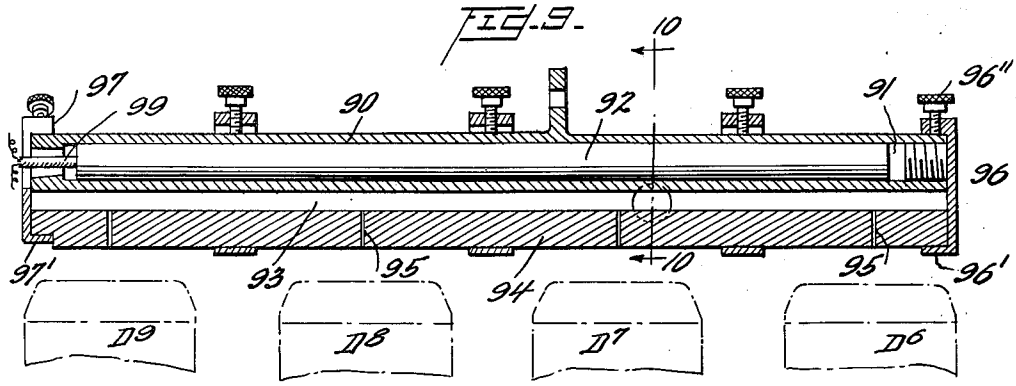


FIG. 10.

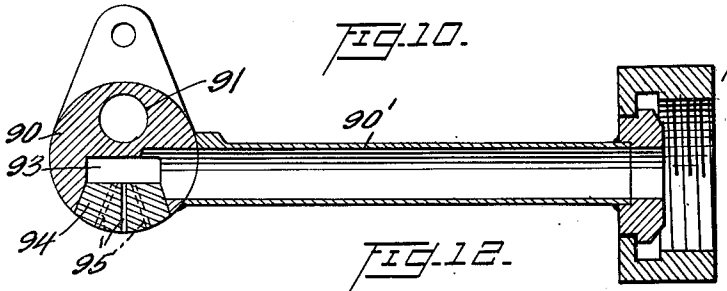


FIG. 11.

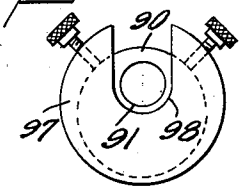


FIG. 12.

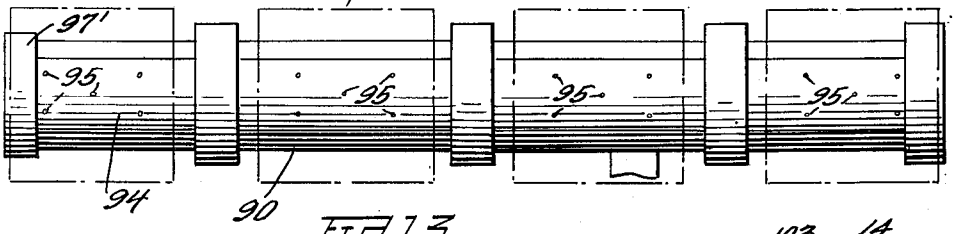


FIG. 13.

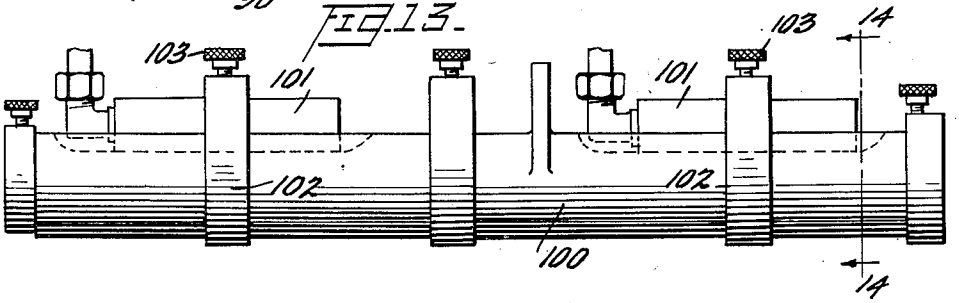
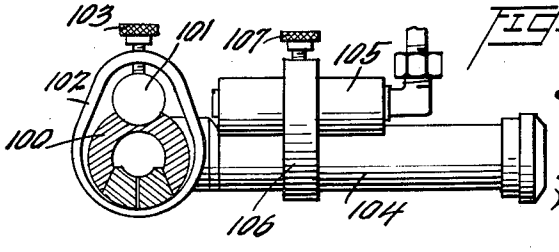


FIG. 14.



Inventor

Julius E. Wollenweber,

By Watson, Cole, Grindle & Watson

Attorney

Patented Aug. 31, 1943 2,328,372

UNITED STATES PATENT OFFICE

2,328,372

MECHANISM FOR AND METHOD OF CHARGING CONTAINERS WITH LIQUID

Julius E. Wollenweber, Detroit, Mich., assignor to The American Paper Bottle Company, Toledo, Ohio, a corporation of Ohio

Application November 25, 1938, Serial No. 242,429

4 Claims. (Cl. 226—69)

This invention relates to mechanisms for and methods of charging containers with liquid and pertains particularly to mechanisms for and methods of charging containers with liquids which have a tendency to foam when agitated.

It is known that numerous kinds of liquids will foam when agitated. The foaming characteristic varies widely, certain liquids foaming when slightly agitated and others only when violently agitated. It is in the general case a matter of small consequence whether a liquid being handled foams or not since the foam quickly subsides and disappears when the agitation ceases. On the other hand, in certain instances, it is highly essential to take into full consideration the foaming characteristics of a liquid, this being particularly true in the design of liquid measuring and handling apparatus for charging containers. Thus in the charging of a container a measured quantity of liquid must be flowed into the container and the container thereafter sealed. If a substantial body of foam is formed upon the upper surface of the liquid in the container after charging, this may interfere, so long as it exists, with the sealing of the container, particularly when the container is of the tubular type and has a foldable or collapsible upper end portion comprising a plurality of panels which are to be relatively folded into predetermined relationship, and permanently secured in such relationship, after charging. When containers of this type are being filled with milk, the problem of preventing and eliminating foaming is a material one since, as is well-known, milk has a marked tendency to form foam when agitated. After charging of the container with the measured quantity of milk, a substantial body of foam is usually present upon the upper surface of the liquid, this foam body projecting upwardly into the foldable end closure of the container. After charging, it is of course desirable to close the container as rapidly as possible not only for reasons of economy in the operation of the container charging machine, but also to minimize the possibility of entry of contaminating substances into the open mouth of the container. Hence it is desirable that such steps as may be possible be taken not only to charge the container with the milk in such manner that foaming is minimized but also to provide means for rapidly dissipating any foam which may have been created.

I have discovered that a body of foam resting upon the upper surface of a liquid in a container, the upper end of which is open, can be readily dissipated by blowing into the upper end of such container, in such manner as to contact with the foam on the surface of the liquid, a gaseous current. Any suitable gas may be employed for this purpose, but naturally it is most economical to use a gas which is readily available at small cost. Advantageously the gaseous stream is heated, it having been found in practice that a body of foam is much more readily dissipated when subjected to the action of a relatively hot stream of gas than when the gas is unheated. Steam may be used with great advantage, for the stated purpose, being not only hot but also sterile, but where facilities for the generation of steam are not readily available, heated air may be employed with success, it being essential of course to provide means which will supply clean uncontaminated air.

While particularly useful when employed in connection with automatic machines for charging milk into containers of the type described, the invention is nevertheless of utility in the packaging of other liquids into other types of containers, as will be apparent to one skilled in the art. Likewise, the mechanism employed for generating and supplying the gaseous stream may vary widely in its details of construction. Several types of such mechanism, which have been used with success, are illustrated in the accompanying drawings by way of example.

In the drawings:

Figure 1 is a side elevation of a mechanism by means of which steam jets may be introduced into the upper end of a container;

Figure 2 shows partially in elevation and partially in section the mechanism for actually directing the gaseous currents into the open ends of containers largely filled with liquid;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a section on line 4—4 of Figure 3;

Figure 5 is a section on line 5—5 of Figure 3;

Figure 6 is a side elevation, partially broken away, of a modified type of gaseous jet directing device;

Figure 7 is a section on line 7—7 of Figure 6;

Figure 8 is an axial section through one of the nozzle devices shown in Figure 6;

Figure 9 is an axial section through a further modified form of gaseous jet directing device;

Figure 10 is a section on line 10—10 of Figure 9;

Figure 11 is an end view of the device shown in Figure 9;

Figure 12 is a bottom view of the same, showing several series of gas discharged apertures;

Figure 13 is a side elevation of a third form of gaseous fluid discharging means suitable for use in practicing the improved method;

Figure 14 is a section on line 14—14 of Figure 13;

Figure 15 is an axial section through a strainer through which the steam passes on its way to the discharge nozzle;

Figure 16 is a perspective view showing a completed container, after charging and sealing; and

Figure 17 is a vertical section through a condensate offtake valve.

While, as has previously been explained, the improved method and apparatus are of general utility and may be made use of in the charging of containers of various types with different kinds of fluid, it is particularly useful when employed in connection with a rapidly operating container charging and sealing machine, for reasons previously pointed out. A small portion of such a machine is illustrated in the drawings, one of its longitudinally extending side frame members being indicated at 10 and a bridging member, extending transversely of the machine, from one side frame member to another, being indicated at 11. A conveyor structure is generally indicated at C, this conveyor extending longitudinally of the machine and including spaced parallel members 13 which together comprise a trackway for the conveyor chain 14 which chain, in the operation of the apparatus, is intermittently actuated in the direction of the arrow A (Figure 2) to intermittently advance containers, such as containers D, D', D^2, D^3, and D^4 (Figure 2), the base of each of these containers being gripped between a pair of container gripping elements mounted on and movable with the conveyor chain 14. Each container comprises a tubular body portion 15, rectangular in horizontal section, and a foldable upper end closure 16 comprising a plurality of relatively stiff panels which may be readily folded, after charging, so that its upper end is peaked and provided with a transversely extending relatively stiff rib, as shown in Figure 16.

In Figure 2 there are diagrammatically illustrated two cylinders 20 and 21 which comprise elements of a liquid measuring and discharging mechanism. This mechanism may vary in its details of construction, but may advantageously be formed in the manner fully disclosed in the copending application of Julius E. Wollenweber, Serial No. 210,257. Associated with each unit 20 and 21 is a discharge nozzle, one of which is indicated at 22 and the other at 23, these discharge nozzles being positioned immediately above the conveyor C and in position to discharge liquid such as milk downwardly into containers whose open mouths are successively positioned in close proximity thereto. Charging of each container is effected in two stages where the containers are of large capacity, one half of the charge being projected into any single container through the nozzle 22 and the remainder through the nozzle 23 at a later time. Thus while the container D^4 is receiving the first portion of its liquid charge when positioned as shown in Figure 2, the container D^2 is receiving the remainder of its full charge, the container D^3 intermediate containers D^2 and D^4 temporarily occupying a position in which it receives no liquid, thus allowing the foam created by the first charging operation to subside from natural causes as much as possible before this container passes under the discharge nozzle 23.

When fully charged each container is filled with liquid up to the level indicated at 24 in the drawings and, despite the ability of the charging mechanism to introduce the liquid into the successive containers with the least possible amount of objectionable foam, a charged container occupying the position D' will frequently have upon its upper surface a substantial body of foam which, unless removed before the time that the container reaches the means for closing the upper end of the container, may be at least in part forced from the open end of the container as the closure panels are inwardly and downwardly deflected.

The means for subjecting each successive container to the action of a gaseous blast, immediately after it is charged, will now be described. The form of the gas discharging mechanism illustrated in Figures 1 to 5 is preferably employed when steam is the gaseous medium to be used for dissipating the foam. Portion of a conduit for leading steam, at the desired temperature and under the desired pressure, from a suitable source of supply, is indicated at 30, the direction of flow of steam being indicated by the arrow B (Figure 1). This steam enters a separator 31 which may be of any desired or standard type and by means of which water of condensation can be removed together with impurities. After issuing from the separator 31 the steam passes upwardly through a conduit 32 into a strainer 33 by means of which it is subjected to a further straining operation. From strainer 33 the steam is led, through pipe or conduit 34, toward the body 35 of the steam discharge device generally indicated at 36, body 35 being rigidly secured to the bridging member 11. Through an aperture 37 formed in the wall of body 35 steam may pass from conduit 34 into the hollow interior of this body. Intermediate the strainer 33 and the steam jet device 36 the conduit 34 is provided with a valve 38, preferably of the needle type, by means of which the flow of steam to the discharge device may be accurately regulated.

The floor 39 of the steam chamber within the hollow body 35 is provided with an upstanding tubular member 40, the lower end of which registers with a steam discharge port 41 formed in the floor or bottom 39, port 41 comprising a valve controlled port through which steam may flow downwardly into the horizontal duct or conduit 42. Each end of conduit 42 is in communication with the interior of a nozzle member, one such nozzle being indicated at 43 and the other at 44, the nozzles being preferably cup-shaped, as shown, and the upwardly extending peripheral flange of each nozzle having an upwardly facing annular surface which directly underlies a similar but downwardly facing annular surface formed upon a downwardly projecting annular portion 45 of body 35, an annular sealing ring or washer 46 being interposed between these mutually facing surfaces.

Each nozzle is attached to the body 35 of the jet device by means of a screw, one such screw being indicated at 48 and the other at 49, each screw extending upwardly through a central aperture provided in the nozzle for its reception and having its other end in threaded engagement with a correspondingly threaded bore formed in the undersurface of body 35. Each nozzle has formed therein a plurality of downwardly and outwardly inclined gas discharge ducts 50 and the securing screws 48 and 49 are

likewise axially apertured, as indicated in Figure 4 at 51, a radial bore 52 bringing such aperture into communication with the interior of the associated nozzle. Through the several discharge ducts 50, and the central discharge duct 51, steam downwardly flowing to each nozzle may be discharged into the upper end of a container positioned just below it and, during the operation of the machine, this steam flow is preferably uninterrupted, so that each newly charged container is submitted first to the action of gaseous jets projected downwardly from the nozzle 43 and thereafter to jets projected downwardly from nozzle 44.

Steam flow, however, is automatically interrupted when the machine is shut down either intentionally or by accident, the valve 55, located in the upwardly extending tubular duct 40 being adapted to descend when the conveyor driving motor is de-energized, to close the aperture 41, thus immediately stopping the flow of steam which, in the absence of such valve, would continue and cause heating of the liquid contents of the two containers immediately below the respective nozzles. The upper end of valve 55 is pivotally connected to the lower end of a vertically reciprocable plunger 56 located within the central aperture of a solenoid magnet 57 which is supported upon a bracket 58 mounted upon the top plate 59 of the jet device 36. A cylindrical casing 60 encloses the magnet and its support. The motor which drives the conveyor and operates the charging apparatus is diagrammatically indicated at 62 in Figure 1, and two electrical supply mains or conductors at 63 and 64, respectively. The magnet coil 57 is connected by electric conductors 65 and 66 to conduits 63 and 64, respectively, and hence electromagnet 57 is energized only so long as the motor 62 is energized. It is apparent, therefore, that the valve 55 of the jet device will be raised when the motor is energized and will be lowered and closed automatically when the motor is de-energized, the valve being projected downwardly into closed position by its own weight and the weight of the solenoid plunger 56 to which it is connected.

It will be perceived that the two nozzles 43 and 44 are at different elevations, the nozzle 44 being closer to the container D than is the nozzle 43 to container D'. It is found advantageous to arrange these nozzles at different elevations and to effect the defoaming or foam dissipating operation in two stages instead of in one stage, particularly when the machine is being rapidly operated, since a substantial body of foam may be more satisfactorily dealt with in this manner, portion of the foam being removed in one operation and the remainder in a second operation without placing the steam under undue pressure.

Each nozzle is provided with an offtake for water of condensation, the offtake for nozzle 43 being clearly illustrated in Figures 3 and 4 and the offtake for nozzle 44 being exactly similar. This offtake comprises a tubular extension 68 terminating in a downturned portion 69 also provided with a duct or conduit, the upper end of this duct being in communication at all times with the outer end of the horizontal duct of tubular member 68. Water of condensation which collects upon the upper surface of the bottom of nozzle 43 may escape through the communicating channels formed in members 68 and 69 at any time during the operation of the apparatus and suitable means may be provided for collecting this escaping water and leading it to a sump. The outer end of the horizontally extending tubular member 68 is closed by a screw or plug 70 which may be removed when it is desired to clean the apparatus by passing steam under substantial pressure therethrough, all water of condensation and possible impurities being blown from the end of the tubular member 68.

The details of the strainer 33 and of the valve 38 may be varied as desired. One form of strainer is shown in section in Figure 15 and is seen to comprise a hollow casing 71 having an inlet port 72 and an outer port 73, with a removable disc-like cover 74 secured in position by a clamping yoke 75 and a manually operable screw 76. Within the casing 71 is a cylindrical screen 77 the upper end of which is connected to a ring 78 and the lower end to an annular member 79. It is essential that all portions of the apparatus be of such character as to be readily disassembled since frequent cleaning is necessary.

In Figures 6 and 7 a modified form of device for directing gaseous jets into containers is shown. This is especially suited for use when one nozzle only is employed although two or more such devices may be made use of when defoaming in a plurality of stages is desired. The jet device comprises essentially a hollow cylindrical member 80 having a plurality of apertures formed in its closed lower end 81, in each of which apertures a nozzle or jet member 82 is threaded. Spaced above the lower end 81 of member 80 is a false bottom 83 having an aperture 84 therein through which steam may pass downwardly from the vertically extending conduit or channel 85, the flow being controlled by vertically reciprocable valve 86 the upper end of which is connected to the plunger of a solenoid magnet of the type previously described, and which is located within the casing 87, portion of which is illustrated. A conduit for leading steam to the interior of member 80 is indicated at 88 and a conduit, at a lower elevation, through which water of condensation may escape, is indicated at 89.

In Figures 9 to 12 there is illustrated a jet device by means of which streams of heated air may be projected into the open upper ends of containers. This device comprises essentially an elongated member 90 having a cylindrical bore 91 for the reception of one or more heating elements of the electrically energized type, one such element being indicated at 92. By means of this element the member 90 may be heated to the desired temperature. Beneath the longitudinal bore 91, member 90 is provided with an elongated downwardly opening recess 93 within which is tightly fitted an elongated nozzle member 94 provided with a plurality of gas discharged ducts 95, arranged in groups of five, as shown in Figure 12. The interior of the longitudinal groove 93, above the nozzle 94, is in communication with means for supplying air under light pressure, the tube 90' comprising a portion of this connecting means. The elongated nozzle member 94 is supported at its ends by means of flanged caps 96 and 97, the cap 96 having an annular peripheral flange 96' through which a thumb screw 96'' passes and by means of which the cap may be secured in position and the peripheral flange 97' of cap 97 being interrupted, as shown clearly in Figure 11, to provide a space 98 registering with the end of the bore 91 and through which wires 99, leading from the heating unit 92, may project, which wires may be connected to a suitable source of

electric current. The air flowing into the jet device through the tube 90' is heated, while passing through this device, to the desired degree prior to its discharge from the air discharge ducts 95. This appliance has been designed to simultaneously direct heated gaseous streams into the upper ends of four containers, such as indicated at D^6, D^7, D^8, and D^9, and it will be clear that it may be modified so as to simultaneously direct jets of heated air to the open ends of any desired number of containers simultaneously, depending upon the nature of the fluid which is charged into such containers and the speed of operation of the container advancing means.

In Figures 13 and 14 a second form of air jet device is shown, this being generally similar to that just described but having heating units secured exteriorly thereto instead of being housed within the same. Thus to the longitudinally extending main member 100 there are secured two heating units, preferably of the electrical type, indicated at 101, each of these units being seated within a recess or groove formed in the upper surface of member 100. The heating units are held in place by means of bands 102, each band being provided with a thumb screw 103 which insures tight contact between the lower surface of the heating unit and the surface of the recess in which it is located. Upon the tube 104 through which air under light pressure is conducted into the hollow interior of member 100 there is secured a third heating unit 105, by means of a band 106 and thumb screw 107, and, if desired, additional heating units may thus be secured to the metallic conduit through which the air is led.

In the form of the invention disclosed in Figures 1, 2 and 3 means is provided for draining off water of condensation which may collect upon the floor or bottom of body 35. It will be appreciated that there will be a substantial accumulation of condensate when steam enters the body 35 after a long shut-down, during which the body has cooled to room temperature. A condensed steam offtake pipe 34^2 is provided for this purpose, one end of this pipe being in free communication with the interior of body 35, at the floor level thereof, and the other end with the interior of a valve body 34^3 having a downwardly opening discharge port 34^4 controlled by a valve 34^5 which is manually adjustable. The conical valve seat is provided with a narrow groove 34^6 through which a small amount of steam may escape even when the valve is closed, together with water of condensation. When the steam is turned on after a shut-down and a large body of water forms in the body 35 the valve 34^5 is opened and the water allowed to escape. After this the valve is closed and normal condensation allowed to escape through groove 34^6. If desired, this valve structure could be replaced by a steam trap.

Still further forms of the invention may be devised to suit special circumstances and the invention in its broader aspects is quite independent of any particular mechanism. However, the several mechanisms which have been illustrated and described have been proven to be eminently successful for rapidly dissipating layers of foam from the upper surfaces of containers just previously charged with milk.

Having thus described the invention, what is claimed as desired to be secure by Letters Patent is:

1. Mechanism of the class described comprising, in combination, a conveyor for advancing a series of containers, the upper ends of which are open, and means positioned above the conveyor for directing downwardly into each successive container a gaseous current, said means including two nozzles spaced longitudinally of the conveyor and unequally spaced from the conveyor.

2. Mechanism of the class described comprising, in combination, a conveyor for advancing a series of containers, the upper ends of which are open, so as to successively pass a given point, and means positioned above the conveyor for directing downwardly into each successive container a plurality of jets of gas, so that any foam within the container will be reduced or broken down.

3. Mechanism of the class described comprising, in combination, a conveyor for advancing a series of containers, the upper ends of which are open, so as to successively pass a given point, and means positioned above the conveyor for directing downwardly into each successive container a plurality of downwardly diverging jets of gas to reach and break down any foam within the container.

4. In the art of charging containers with liquids such as milk which foam when agitated, passing a stream of milk downwardly into a container through the open mouth thereof to partially fill the same, and immediately thereafter projecting downwardly into the container through said open mouth and into any body of foam resting upon the surface of the liquid in the container, a jet of steam to dissipate such foam, thereby making it possible to promptly close and seal the container mouth.

JULIUS E. WOLLENWEBER.