July 31, 1945. C. W. HEINLE 2,380,434

LIQUID FILLING MACHINE

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Fig 1

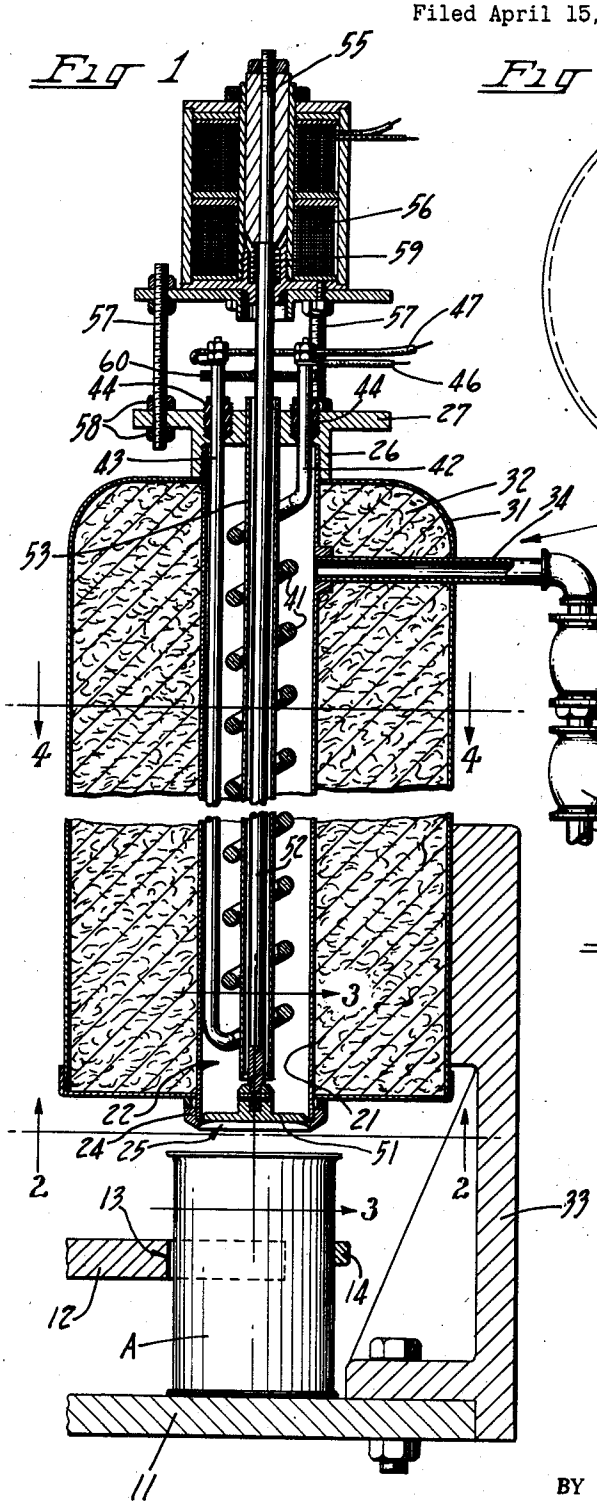


Fig 2

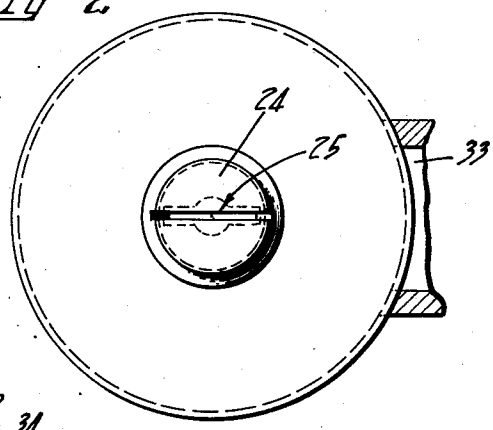
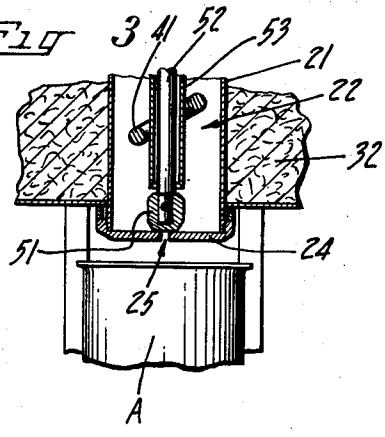


Fig 3



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Fig 4

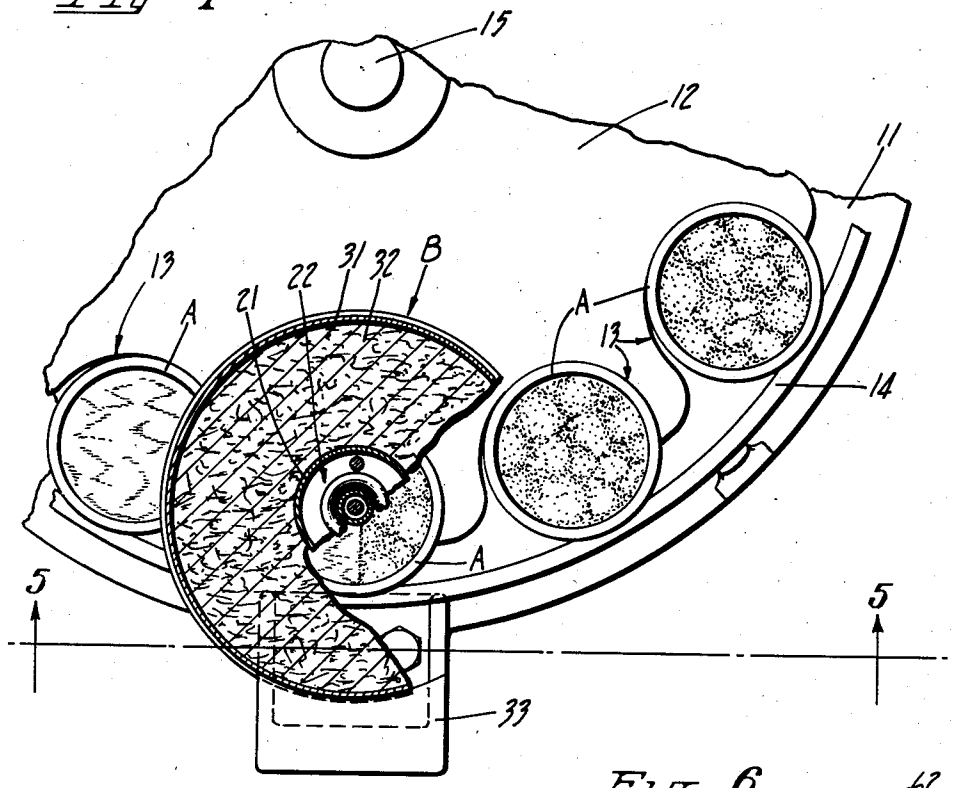


Fig 5

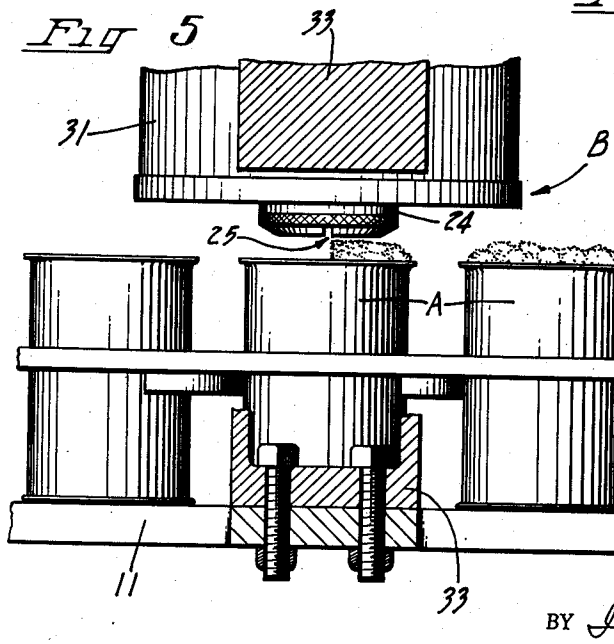
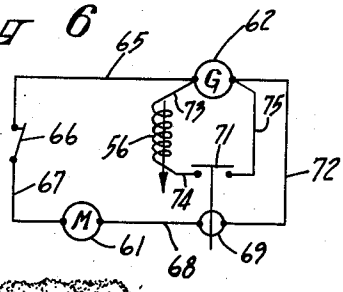


Fig 6



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UNITED STATES PATENT OFFICE

2,380,434

LIQUID FILLING MACHINE

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Application April 15, 1941, Serial No. 388,679

4 Claims. (Cl. 252—361)

The present invention relates to machines for treating liquids which readily foam upon agitation and has particular reference to bursting the bubbles which constitute the foam by subjecting them to a heated gas.

In the filling of liquids such as beer, ale and other similar products into cans considerable difficulty sometimes is experienced with the foaming over of the liquid before the can is sealed. Such foaming over of the liquid wastes the product and tends to cause slack filling of the cans. In products such as beer and ale, two kinds of foam usually exist. One form of foam is of a fine, creamy texture which for the most part consists of beer and carbon dioxide. This foam is desirable and preferably is retained. The other foam constitutes larger bubbles which for the most part are rich in air content. It is this latter type of foam which causes the undesirable spilling over and loss of product.

The instant invention contemplates overcoming this difficulty by providing a foam destroying device which directs heated gas against the foam to expand and burst the bubbles.

An object therefore of the invention is the provision, in a can filling machine for liquids which readily foam upon agitation, of devices which direct a heated gas against the foam to expand and burst the bubbles, to reduce the air content of the liquid and to prevent spilling over of the foam with its resultant slack filling of the can.

Another object is the provision of such a device wherein the bursting of the foam bubbles is effected by heated air which is directed into the head space of the can.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a sectional view of a device embodying the instant invention, with parts broken away;

Fig. 2 is a horizontal section looking upwardly as taken substantially along the line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a sectional detail taken substantially along the line 3—3 in Fig. 1, with parts broken away;

Fig. 4 is a horizontal section taken substantially along the line 4—4 in Fig. 1, with parts broken away;

Fig. 5 is a vertical section taken substantially along the line 5—5 in Fig. 4, with parts broken away; and

Fig. 6 is a wiring diagram of the electric apparatus used with the device.

As a preferred embodiment of the invention the drawings illustrate principal parts of a conventional can filling machine containing the improved inventive parts in which cans A are filled with beer. The cans after filling are propelled across a stationary table 11 (Fig. 4) by a rotating turret 12 having spaced pockets 13 in which the filled cans are located. A curved guide rail 14, disposed adjacent the outer periphery of the turret, retains the cans in their pockets. The turret is mounted on a vertical shaft 15 which is journaled in bearings in the table and which may be rotated in any suitable manner.

Filling of the beer into the cans agitates it and thereupon starts the forming of the air bubbles hereinbefore mentioned. In order to reduce the air content of the liquid and to prevent spilling of the foam over the edge of the cans, the latter immediately after filling are propelled through a de-foaming station B.

At the station B there is a de-foaming device which includes a vertical tubular casing 21 (Fig. 1) which encloses a heating chamber 22. The bottom end of the casing is threaded and carries a nozzle 24 having a diametrically located narrow discharge slot 25 (see also Figs. 2 and 3). The upper end of the casing is also threaded and carries a cap 26 having a broad flange 27.

The outside surface of the casing 21 is protected against heat radiation by a surrounding cover or casing 31 which is interposed between and held in place by the nozzle 24 and the cap 26. The side walls of the cover are spaced away from the casing and the intervening space is filled with fibrous heat resistant or insulating material 32. The cover is secured to a bracket 33 which is bolted to the table 11. This bracket constitutes the main support for the entire device.

Air under a slight pressure of from one to three pounds per square inch is introduced into the heating chamber 22 by way of an inlet pipe 34. This pipe extends through the cover 31 and through the insulating material 32 and is threaded into the casing 21 near its upper end. The outer end of the pipe connects with an air supply line which includes a pressure regulator 35, a shut-off valve 36 and a main supply pipe 37 which leads from any suitable supply of compressed air.

The air under pressure entering the heating chamber 22 is immediately heated to a high

temperature of approximately 700° F. This heating of the incoming air preferably is brought about by an electric heating unit which includes a vertical coil 41. The ends of the coil are formed with lead rods 42, 43 which extend up through insulating bushings 44 which are threaded into the cap 26 of the casing 21. The upper ends of the rods extend above the bushings and are connected to wires 46, 47 which lead to a suitable source of electric energy. Electric energy flowing through the coil heats it to the desired degree, as hereinbefore mentioned.

Thus the air introduced into the heating chamber 22 is immediately heated and is forced down through the chamber by the incoming unheated air and thus flows out of the slot 25 in the nozzle 24. The heated air issuing from the nozzle flows down onto the top of a filled can A passing under the device and impinges against the foam on the beer in the cans passing through the station. The heated air heats and expands the foam bubbles rich in air content and thus bursts them while leaving the creamy desirable CO_2 foam intact. Breaking of these large air bubbles reduces the air content of the liquid and also prevents the spilling over of the foam and thus prevents waste of the beer and slack filling of the cans.

Provision is made for cutting off the flow of hot air from the nozzle 24 when the machine stops operating. This is brought about by a cut-off valve 51 (Figs. 1 and 2) which is located within the casing 21 and which is disposed adjacent the nozzle slot 25. The valve is secured to the lower end of a vertical actuating rod 52 which extends up through a vent tube 53 disposed within the heating coil 41. The lower end of the vent tube terminates adjacent the valve 51 in spaced relation thereto while its upper end is secured in the casing cap 26.

The valve actuating rod 52 extends above the upper end of the vent tube 53 and is secured to a movable core 55 of a normally de-energized electric solenoid 56. The solenoid is supported on vertical adjusting screws 57 which are held by nuts 58 in the flange 27 of the casing cap 26. A compression spring 59 located within the solenoid normally supports the core and the valve rod and thus holds the valve above and away from the nozzle slot 25. A disc 60 of insulating material is secured to the actuating rod and contains two holes into which the lead rods 43, 44 fit. This disc prevents the actuating rod from turning and holds the valve in alignment with the nozzle slot 25.

When the solenoid 56 is energized, its core 55 is drawn down and this moves down the actuating rod 52 and the valve 51. The valve thus closes against and covers the nozzle slot 25 and this cuts off the flow of hot air from the nozzle. The unused hot air in the heating chamber 22 thereupon flows up through the vent tube 53 thus uncovered and is vented at the upper end of the tube to the outside atmosphere. When the valve 51 is in its operative open position to permit flow of hot air through nozzle slot 25, the valve is seated against the inner open end of the vent tube 53 which has a beveled seat (Fig. 3) for this purpose, to prevent the heated air from escaping from the chamber 22 through said tube. Energizing of the solenoid is effected in time with the stopping of the filling machine and for this purpose the solenoid is connected in circuit with an electric motor 61 (Fig. 6) which constitutes the main source of power for operating the machine.

Reference should be now had to the wiring diagram in Fig. 6, which illustrates the circuits for the solenoid and the motor 61. Electric energy for these circuits is supplied from any suitable source of such energy such as a generator 62. The first of these circuits is a motor circuit which includes a wire 65 leading from the generator, a stop switch 66, a wire 67 the motor 61, a wire 68, a coil 69 of a normally open relay switch 71, and a wire 72 connecting again with the generator.

When the stop switch 66 is closed electric energy flowing along this circuit excites the motor 61 and thus keeps the machine operating. This energy also energizes the coil 69 and holds the relay switch 71 open. The relay switch is part of a solenoid circuit which includes the solenoid 56. The solenoid is connected by a wire 73 to the generator and by a wire 74 to the relay switch. The relay switch is also connected by a wire 75 to the generator.

Hence when the stop switch 66 is opened for any reason, the motor circuit is broken and the motor 61 stops. The machine thereupon ceases its operations. This breaking of the motor circuit de-energizes the coil 69 and hence the relay switch 71 closes. Closing of the relay switch establishes the solenoid circuit and energy from the generator 62 flows along the circuit and energizes the solenoid 56. The valve 51 in the heating chamber 22 thus closes the nozzle 24 and stops the flow of hot air therefrom, with attendant venting of the chamber as hereinbefore mentioned.

When the stop switch 66 is again closed, the motor circuit is re-established. The motor and the machine again start operating. The coil of the relay switch 71 again becomes energized and this opens the relay switch. The solenoid circuit is thus broken and the solenoid 56 becomes de-energized. This permits the spring 59 in the solenoid to lift the valve actuating rod 52 and the valve 51 and thereby open the nozzle 24. The hot air from the heating chamber 22 is thus released and again issues forth from the nozzle to burst the foam bubbles on the moving cans as hereinbefore explained.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for treating foam on liquids in containers, the combination of devices for supporting a liquid filled container, instrumentalities for heating a gas to a temperature higher than that of said foam, a nozzle connected with said heating instrumentalities having an elongated slot therein for continuously projecting the heated gas downwardly and gently in an unbroken elongated curtain, and means for relatively moving said container and said nozzle whereby the foam is passed through the curtain of heated gas and the bubbles constituting the foam are broken by expansion due to the increased temperature imparted to the foam bubbles by said heated gas.

2. In a machine for treating foam on liquids in containers advanced through the machine in a predetermined path of travel, the combination of a casing enclosing a heating chamber having means therein for heating air to a predetermined temperature, a nozzle on said chamber having an elongated slot therein disposed substantially normal to the path of travel of the containers for projecting the heated air into a predetermined region, a valve controlling the opening and closing of said nozzle, an electric solenoid connecting with said valve, a conveyor for propelling liquid filled containers into and through said heated region for subjecting the foam on the liquid in the container to said heated air to expand and burst the foam bubbles, and electric means for actuating the machine including said conveyor and for energizing and de-energizing said solenoid to open and close said valve in accordance with the respective starting and stopping of the machine.

3. In a machine for treating foam on liquids in containers, the combination of a conveyor for propelling liquid filled containers along a predetermined path of travel, a casing disposed adjacent the path of travel of the containers and enclosing a heating chamber for heating air to a predetermined temperature, a nozzle on said casing having an elongated slot therein disposed substantially perpendicular to the path of travel of the containers for discharging the heated air against the foam on the liquid in the containers to expand and burst the foam bubbles, valve means for opening and closing said nozzle, and a vent tube in said casing for venting the heated air from the heating chamber when the valve is closed.

4. In a machine for treating foam on liquids in containers, the combination of a conveyor for propelling liquid filled containers along a predetermined path of travel, a casing disposed adjacent the path of travel of the containers and enclosing a chamber for heating a gaseous medium to a predetermined temperature, a nozzle on said casing having an elongated slot therein disposed substantially perpendicular to the path of travel of the containers for discharging the heated medium against the foam on the liquid in the containers to expand and burst the foam bubbles, movable valve means adjacent said slot for opening and closing said nozzle, a vent tube in said casing for venting the heated air from the heating chamber, and means for opening and closing said valve, whereby the valve when in open position to expose said slot is seated against said vent tube to close the latter against the passage of heating medium therethrough, said valve when in the opposite position to close said slot being spaced from said vent tube to permit passage therethrough of the heated medium to vent said chamber.

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