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PROCESS FOR THE IMPREGNATION OF MILK BEVERAGES WITH CARBONIC ACID WITH SUBSEQUENT DRAW-OFF UNDER COUNTER-PRESSURE INTO RETAILING VESSELS

Filed Feb. 27, 1940

Serial No. 321,084

2 Sheets-Sheet 1

Fig. 1

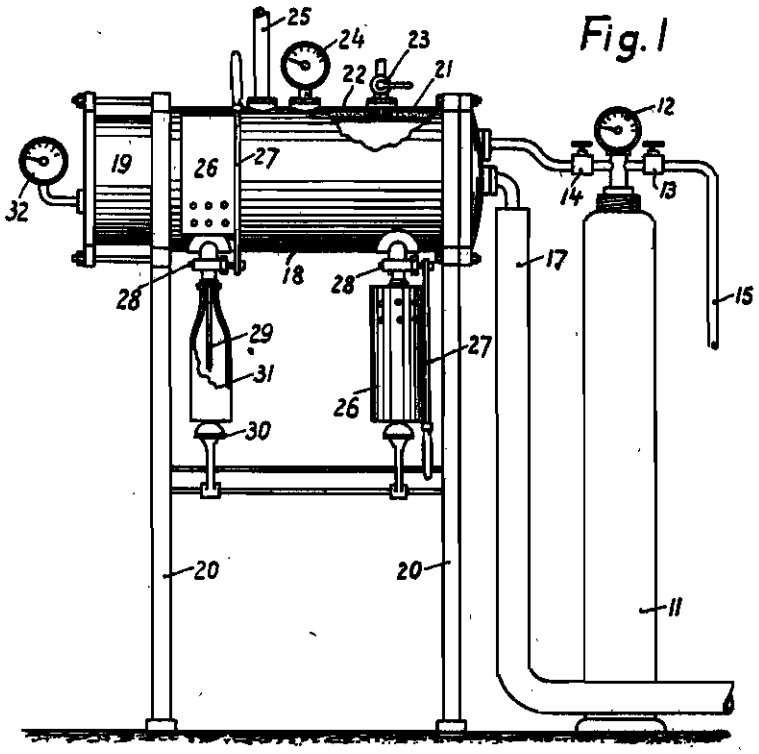

Fig. 1a

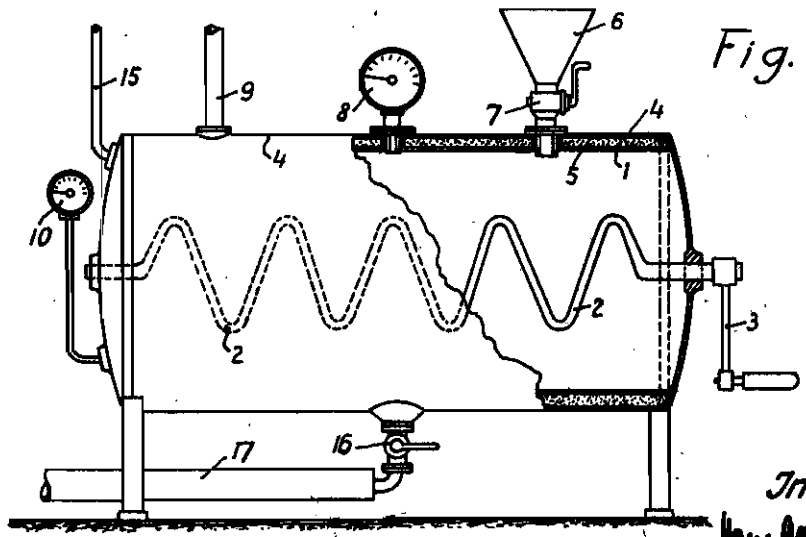

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Fig. 2

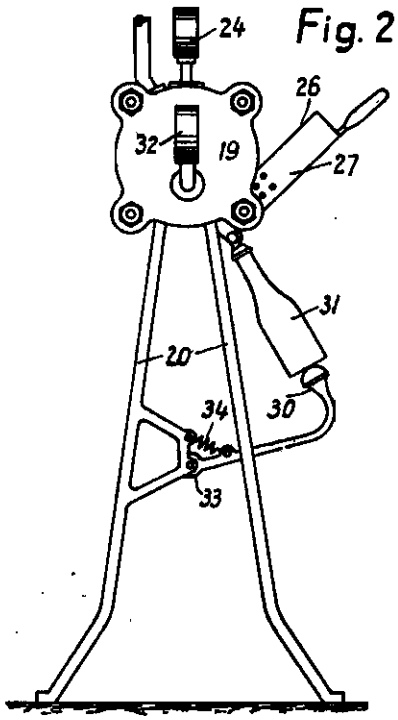


Fig. 3

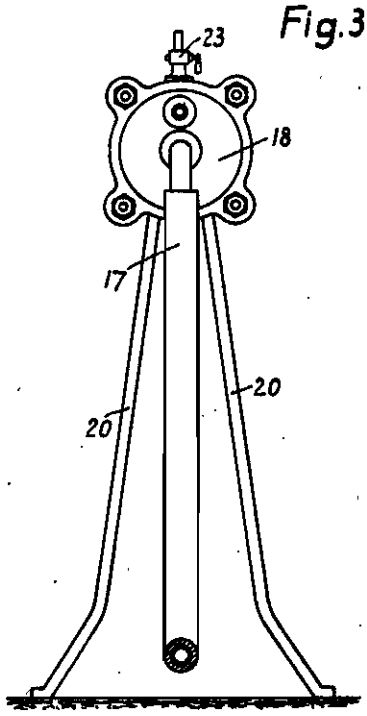


Fig. 4

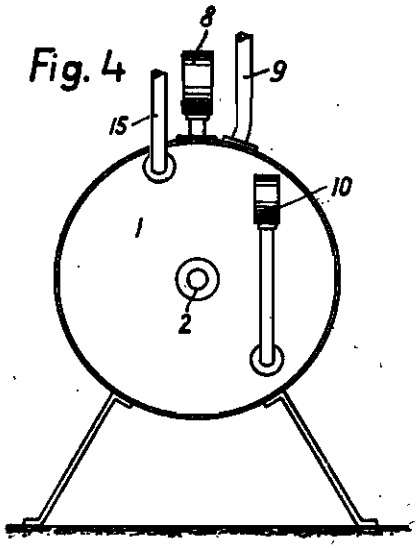
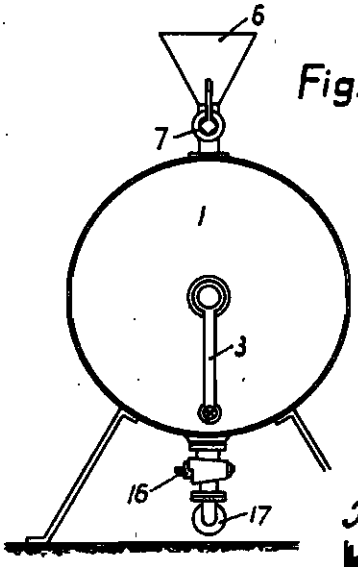


Fig. 5



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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE IMPREGNATION OF MILK BEVERAGES WITH CARBONIC ACID WITH SUBSEQUENT DRAW-OFF UNDER COUNTER-PRESSURE INTO RETAILING VESSELS

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Application filed February 27, 1940

In the preparation of milk beverages containing carbonic acid it is known to treat the milk with carbonic acid at about 2 atm. pressure. It is also known to treat milk with carbonic acid in the cold. In drawing off the carbonic acid beverage under counter-pressure into bottles or similar closeable retailing vessels the extremely disturbing disadvantage is found that the beverage, even if it has been previously sterilised (pasteurised) and homogenised at pressures up to 150 atm., can only be so far slowly compressed into the retailing vessel at the hitherto usual draw-off temperature of about 4 degrees Celsius above zero, in spite of the use of counterpressure, to such an extent that it fills the volume of the retailing vessel completely but without subsequent settling down. Its power of frothing is so great and its volume so expanded by the large quantity of very fine gas spaces in the bubbles that it frequently requires a rest of many hours in order to attain a settling down of this volume into the purely liquid condition whereby there arises a gas space above the liquid surface which on opening and suddenly releasing has resulted in a turbulent gushing forth and spurting out of the thus suddenly released leyer of liquid by which the coverings and objects in the vicinity, as well as the persons opening the flask are frequently soiled. Also the stability and keeping power of the contents of such a container which is only partly filled with beverage and the other part with gas, is greatly reduced.

The previously described disadvantages may be avoided according to the invention if the cooling procedure is carried out in two stages at different times with a rest interval in between and at two different cooling temperatures.

According to the invention therefore, in the above manner the previously sterilised (pasteurised) material which has been homogenised at pressures up to 150 Atm. is precooled to about 4 degrees Celsius above zero, stored in a cooling container for a definite time, preferably between 12 to 24 hours, and then cooled down to the region of the freezing point, i. e. to zero degrees Celsius, and mixed with carbonic acid at about 2 atm. pressure up to saturation, whereupon it is led under the same pressure slowly and without reduction of temperature to a second cooling container whose similarly highly compressed carbonic acid atmosphere is released into the mass as it flows thereto through the connecting conduit. When the material which has been thus transferred and considerably cooled has settled down in the second cooling container, which can be observed through a window or a partial construction of the container wall out of glass, by increasing the carbonic acid pressure existing on the surface by half an atmosphere, then the material is filled from the container into flasks filled with carbonic acid gas at the same high pressure, sealed and stored in suitable cool rooms. It lasts when treated in such manner for about 14 days without becoming viscous and it only froths after opening the seal of the bottle when poured into the glass, without previously spurting; waste of liquid and damage are thus avoided with certainty.

In the figures of the attached drawings is shown an example of a machine layout suitable for carrying out this process.

Fig. 1 shows in side view, with partial longitudinal section, the pre-cooling and low cooling container with the necessary connecting conduits and equipment.

Fig. 2 shows a front view of the low cooling container with built-on draw off apparatus for filling under counter-pressure.

Fig. 3 shows a front view on the further side of the low-cooling container.

Fig. 4 shows a front view of the rear side of the pre-cooling container and

Fig. 5 shows a front view from the driving side of the mixing arrangement of the pre-cooling container.

1 denotes the pre-cooling container, 2 is a mixing worm running therethrough operated by the hand crank 3 or a motor, 4 is a cooling jacket surrounding the wall of container 1 at a suitable spacing, 5 is the cooling brine which fills this space, 6 is the entry funnel for the material to be treated, 7 its regulating cock, 8 is a pressure gauge dial for the carbonic acid pressure, 9 is the brine inlet, 10 is a thermometer for the low temperatures with pressure gauge 12 and reducing valves 13 and 14, 15 is the carbonic acid inlet pipe to the pre-cooler 1, 16 is a shut-off cock for the pre-cooled material to be treated, 17 is a transfer conduit between the containers 1 and 18 which is surrounded with heat insulating material, 18 is the low-cooling container, 19 is a continuation of container 18, constructed out of glass and closed by a metallic front plate, and held against the jacket 18, 20 is the supporting frame for the containers 18 and 19, 21 is a jacket surrounding the container 18 at a definite spacing, 22 is the cooling brine filling the cylindrical space between the containers 19 and 21 which is introduced through 26, 23 is a de-gassing valve, 24 is a pressure indicator, 26 denotes half-cylin-

drical protective cages for the bottles 29 which are movable about the swivels 28, 30 denotes supports for the bases of the bottles which are rotatable round the axis 33 and held in the working position by the spring 34, and 27 is a valve lever for controlling the swivel 28.

After the milk which has been sterilised and homogenised at 150 Atm. pressure, and to which may be added flavourings, syrups, sweetening agents, etc., has been run into the container 1 in a quantity regulated by the position of the stop-cock 7 it remains therein for a period of 12 to 24 hours at rest until it is completely and uniformly cooled to 4 degrees Celsius above zero. Then the temperature in the container 1 is reduced to 0 degrees Celsius by a suitable circulation of brine, and carbonic acid at 2 Atm. pressure is introduced into the container 1 through 15 by means of 11 and 13, whereon the stirring mechanisms 2 and 3 are operated until the liquid is fully saturated with carbonic acid. Carbonic acid at 2 Atm. pressure is now led by a pipe from 11 through 14, with cock 23 opened, into the container 18 which has been cooled to zero degrees Celsius, until all atmospheric air has been displaced therefrom and there exists in it an atmosphere consisting entirely of carbonic acid which is maintained at 2 Atm. pressure after closing the cock 23.

By opening the cocks 16 and 23 the low-cooled milk is now transferred through 17 into the tank 16, which is likewise pre-cooled to zero degrees Celsius, on the one hand whilst on the other hand at the same time and quite slowly and continuously by suitable placing of the de-gassing cock 23 the quantity of gaseous carbonic acid corresponding to the qauntity of the added liquid is allowed to escape.

When the containers 18 and 19 are sufficiently full at 2 Atm. pressure the cock 23 is closed and by increasing the pressure of carbonic acid on the liquid surface by ½ Atm. the beverage subsides and this can be observed through 19. Then drawing off under counter-pressure begins in known manner by resting the bottle on 30 with the handle 27 and the protecting cage 26 in the raised position, whereby the carbonic acid entering the bottle displaces the air-content of the bottle. In a neighbouring bottle the transfer of the impregnated liquid from 16 and 19 takes place meanwhile, when the handle 27 and cage 26 are lowered, under the counter-pressure of the carbonic acid previously introduced into the empty bottle, until the bottle volume is completely filled while the superfluous quantity of gas escapes. The so filled bottle is now closed and kept cool.

HANS GRIESBECK.