

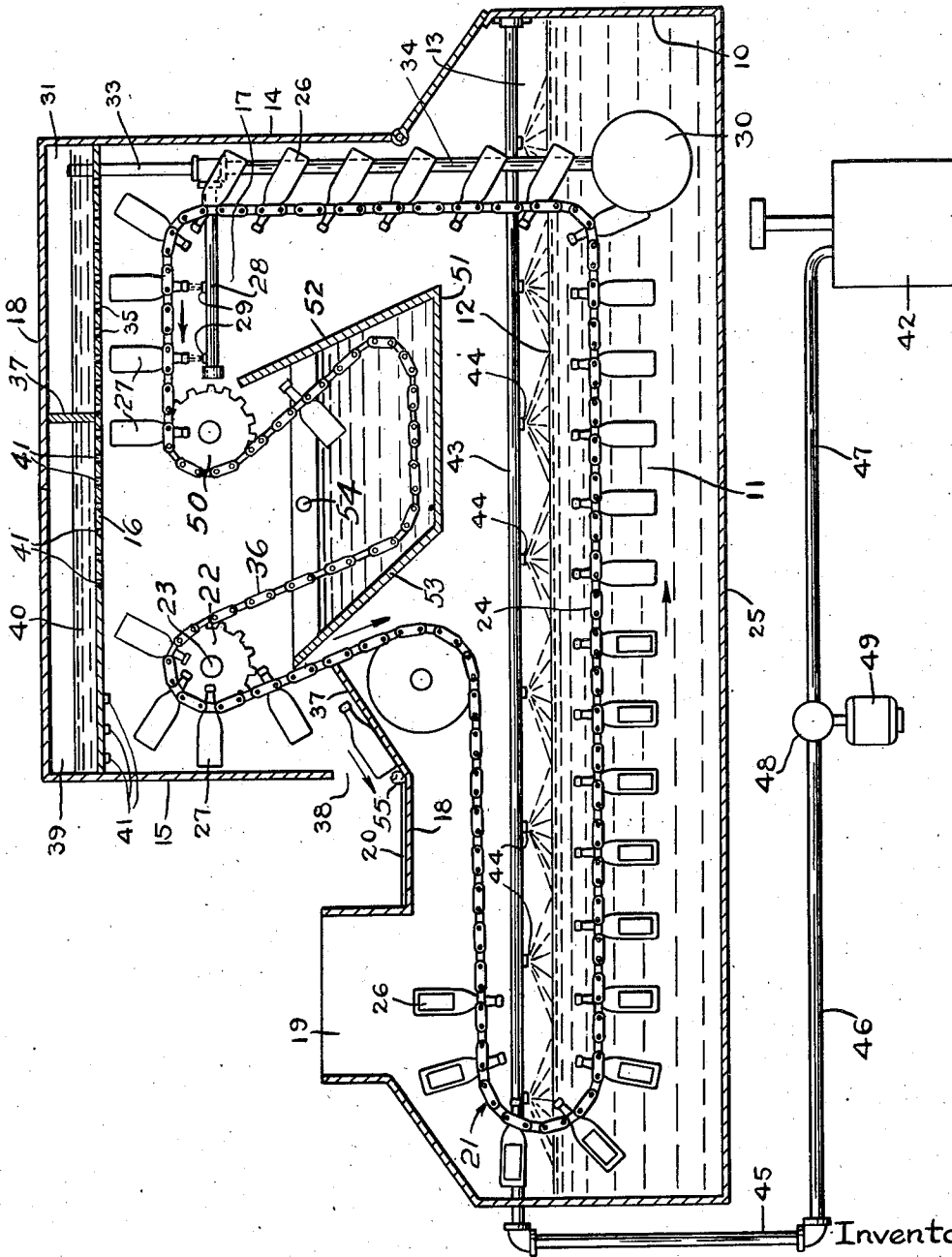
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APPARATUS FOR PREVENTING FOAMING

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APPARATUS FOR PREVENTING FOAMING

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My invention relates to an apparatus for preventing foaming in an agitated body of fluid saponaceous mixture, specifically in connection with mechanism for cleaning bottles. My invention, herein defined and claimed, is adapted to provide a simple and efficient set of instrumentalities for destroying or eliminating froth and foam which tends to form in an agitated body of fluid saponaceous mixture such as is formed in the operation of cleaning empty labeled bottles, such as soft drink bottles.

What is known as soft drinks in general consists of carbonated water in which is held in solution syrups formed of sugar and different flavoring ingredients. Such a mixture forms a pleasing and stimulating drink sold at drug store soda fountains at all times and very largely consumed during warm weather. Soft drinks ordinarily are put up in bottles. Each of these bottles contains substantially a standard glassful of carbonated drink. They are hermetically sealed by means of caps and carry on their sides a label which designates the name of the drink or flavoring and usually also carries the name of its manufacturer. Although such bottled drinks can be cooled in ordinary refrigerators, the usual method of cooling them is to put them in a body of water cooled by ice or by refrigerating apparatus where the bottles remain submerged until sold. The labels must be immersed in the cold water, and to prevent their being quickly washed off through dissolving of the adhesives or glues, special types of such adhesives or glues have been devised, which are either insoluble in water or soluble in such a degree that the labels will not soak off in the time of immersion usually required before sale.

However, the labels will gradually become somewhat defaced or blurred by being soaked under water, and the bottles themselves must be thoroughly washed and cleansed before they can be reused. It follows that apparatus used to wash the bottles not only must be such as to completely clean and sterilize the inside and outside of the bottles, but also must effect removal of the labels and the adhesive or glue by which they were attached to the bottles. For this washing and removing a large tank is provided in which is a fairly concentrated solution of caustic soda which is kept sufficiently heated. In practice, an endless chain carries the bottles through this caustic soda solution usually by a step by step motion which keeps the bottles in the solution for a sufficient length of time. The bottles are subsequently inverted and a powerful jet of the caus-

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tic soda solution is forced into the insides of the bottle for a considerable period of time, splashing back into the main body of the caustic soda solution. Thereafter the bottles are rinsed in clear water and the thoroughly clean bottles are taken from the machine and filled with the carbonated soft drink solutions and are capped and are ready for sale.

In the course of travel of the bottles through the body of caustic soda solution, which, as stated above will be over a considerable period of time, the glue by which the labels are fastened on the bottles will be dissolved away by the caustic solution. The labels then are removed ordinarily by simply falling off in the body of caustic solution or thereafter being washed off by the sprays.

The glue which is taken into the mass of caustic solution has some of the characteristics of fat and lye by which soap is made. The percentage of this adhesive or glue in the body of caustic soda solution increases until finally there is formed a mixture of caustic soda and the organic matter from the glue or adhesive which has the characteristics of a mixture of soap and water. Agitation and particularly splashing of this saponaceous mixture produces films which are tough enough to cause froth or foam from the splashing of the solution falling from the bottles and the top of the tank because of the jets thereof being thrown upward to cleanse both the inside and the outside of the bottles. This is ordinarily referred to as foaming. It is, however, literally the equivalent of the formation of soapsuds. Periodically it becomes so extensive as to entirely fill the whole apparatus and even overflow. This causes considerable periods of idleness or disuse of the plant to get rid of the foam, a deleterious condition which has been experienced in this industry for a long time with no practical means known for conveniently and economically eliminating it.

As is well known in bottling plants where this washing apparatus is employed, means is provided to produce large quantities of carbonated water which is used in connection with syrup and flavoring extracts in making the soft drinks.

I have discovered that if such carbonated water as made for use in bottling the soft drinks is sprayed into the mass of foam as it begins to form, it has the effect of almost instantly causing the foam to break up and disappear and it also tends to eliminate the formation of foam in the main body of the liquid. By this discovery I found that such an application of carbonated water from the carbonator used in the manufac-

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ture of the soft drinks, if made by means of a spray of more or less force distributed over the whole body of the foaming surface of the mass of caustic soda solution in the tank, will have the double effect of destroying the mass of foam already formed and of preventing a recurrence of foaming for several hours.

It is a particular object of my invention, therefore, to provide apparatus for use in connection with well known means of washing labeled bottles and removing the labels therefrom, useable in connection with the standard carbonator employed in making the carbonated water of soft drinks, to convey said carbonated water in a desired amount and to spray it with a suitable degree of force over the surface of a mass of caustic soda solution within the washing tank, thus destroying foam and checking foaming.

It is a further object of my invention to provide apparatus for conveying the carbonated water from any standard carbonator and to cause it to be sprayed over the entire exposed surface of the body of caustic soda solution in the tank.

It is a further object of my invention to provide apparatus adapted to convey carbonated water taken directly from the carbonator employed in connection with bottling soft drinks and to form a spray thereof and to cause said spray to impinge upon all parts of the foaming surface of the body of caustic soda solution in the tank and upon any masses of foam on said surface.

It is a further object of my invention to provide apparatus to control the operation of spraying carbonated water into the caustic soda solution in the tank so that it will take place for a definitely limited time, only long enough to eliminate foam and check foaming, and to provide in connection with such apparatus means such that the spraying step will be effected for such limited short times periodically at sufficiently spaced intervals so the spraying operation will be caused to take place only as frequently and for as short durations as is necessary to eliminate foam and check foaming.

This application is a division of my application, Serial No. 469,761, filed December 21, 1942.

The full objects and advantages of my invention will appear in connection with the description of the apparatus for carrying it into effect, hereinafter given in the appended specification, and the novel features of the invention by which the aforesaid advantageous and desirable results are obtained will be particularly pointed out in the claims.

The single figure of the drawing illustrates a longitudinal cross-sectional view of a bottle washing apparatus of standard construction having associated therewith apparatus for carrying out my invention, some parts of said apparatus being diagrammatically or schematically shown.

The customary bottle washing apparatus comprises a tank 10 having therein a substantial body of caustic soda solution 11 which has its upper surface 12 below the top of an elongated chamber 13 formed within the lower walls of the tank 10, end walls 14 and 15 together with side walls and a top wall 16 enclosing an elevated chamber 17. A specially constructed top wall 18 has therein an inlet opening 19 by means of which the bottles are introduced into the apparatus and an unloading platform 20.

Within the chambers 13 and 17 is an endless chain 21 driven by a sprocket wheel 22 which has its shaft 23 connected with suitable power

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means not shown. The chain 21 is guided by customary control means, not shown, so as to have a long horizontal section 24 thereof extending into and along the body of water 11 in the tank 10 at a point a sufficient distance above the bottom 25 of the tank to permit the bottles to be carried through the body of solution 11 for a considerable period of time. These bottles designated as 26 are introduced into holding sockets in the chain through the opening 19 and are carried from an inverted position to an upright position in the mass of caustic soda solution 11. From the caustic soda solution the bottles 26 are elevated to the upper part of chamber 17 where they are carried in inverted position as indicated at 27 over a horizontal pipe 28 having thereon a series of nozzles 29. The pipe 28 is connected with a pump indicated diagrammatically at 30 which draws the caustic soda solution from the main body 11 and sends it out in forcibly ejected jets from the several nozzles 29. These nozzles 29 are spaced apart exactly the distance between pairs of bottles as clearly shown in the upper part of the figure. The driving means moves the bottles slowly with a step by step motion so that the bottles are successively positioned and held stationary for a requisite period of time above the nozzles 29. The jets from these nozzles are thus caused to enter and scour and wash the insides of the bottles. A second chamber 31 is formed between partitions 16 and 18 with an end wall 32 closing the chamber 31 considerably short of the total length of chamber 17. An extension 33 of pipe 34 leading from the pump 30 carries a body of the caustic soda solution into chamber 31 from which it falls by gravity through openings 35 back over the bottles 27 joining with the return flow of jets from nozzles 29 to splash back into the main body of caustic soda solution 11. It is this splashing back, with a considerable degree of reflex and gravity force which agitates the mass of caustic soda solution 11 so, when it becomes saponaceous, as to produce the froth and foaming which my apparatus is designed to prevent.

The endless chain 21 is turned backward as indicated at 50 and is carried into a body of water in a tank 51 which has a sloping rear wall 52 adapted to drain the caustic supply from nozzles 29 away from the water in tank 51. The bottles are inverted in the water of tank 51 and filled with clean water which is subsequently discharged, as hereinafter pointed out.

The endless chain 21 is also turned backward as indicated at 36 to overlies a sloping platform 37 having an opening below wall 15 as indicated at 38. The second top chamber 39 is provided, from a source not shown, with clean water as indicated at 40, which water flows from nozzles 41 upon the outsides of the bottles 27 and also into the tank 51 and down the sloping front wall 53 thereof and inside of said bottles as they go down the sloping platform 37 by which the bottles are finally cleansed. The excess water is drained off through openings 54 and 55 by means of piping, not shown.

The above apparatus is a standard bottle washing apparatus which usually is of a width such as to carry a single endless chain 21 and, therefore, a single row of bottles through the machine. If, however, a washing machine of larger capacity is provided with one or more endless chains and runs of bottles, my invention, now to be described, is applicable thereto by simply in-

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creasing the number of spraying tubes and rows of nozzles as herein shown.

In bottling plants a carbonator is customarily employed. It is illustrated diagrammatically at 42. Its construction and operation are well known and need not be described here. It is sufficient to state that at all times it forms sufficient quantities of carbonated water which it delivers at quite high pressure to the bottling machine (not shown). There is, therefore, always available in any bottling plant a supply of carbonated water adapted to be delivered at high pressure. The nature of carbonated water produced for use in bottling works is also well known to be a solution of carbonic acid gas in water wherein large volumes of the gas are held in solution because of the pressure within the carbonator, and such excess of gas is released when the pressure is reduced to atmospheric pressure. The term carbonated water is used in this specification with that well known meaning. Having discovered that sprays of carbonated water will check foaming and destroy foam and froth already formed, I run a pipe 43 along the full length of tank 10 spaced above the surface 12 of the caustic soda solution therein. I provide a series of spray nozzles 44 in said pipe directed downwardly toward the surface 12 of the caustic soda solution. The pipe 43 is connected by piping 45, 46, and 47 with the carbonator 42. An automatic valve 48 closes connection between the pipe 43 and the carbonator 42, so that whenever the valve 48 is opened carbonated water will be forcibly sprayed from the carbonator through nozzles 44 and upon the surface 12 of the caustic soda solution within tank 10. Because of the force with which this carbonated water is sprayed out and the number and position of the nozzles 44 this spray will cover the entire surface 12 of the caustic soda solution within the tank 10 and will be injected upon that surface and upon any froth or foam thereon with a considerable degree of force. The valve 48 is of common construction and is operated by any suitable motor indicated diagrammatically at 49, the mechanism of the valve being such that the motor will cause it to open at suitably spaced relatively long intervals of usually from one to one and a half, two, or two and a half hours, but to open for short periods of time, in practice only from one to two minutes.

It will be understood, of course, that it is the carbon dioxide or carbonic acid gas which produces the elimination of foam and the checking of foaming. The carbonated water is really only a carrier of this gas, the gas being placed in solution in the carbonated water under heavy pressure, is released when the pressure is reduced. It follows that when the carbonated water is driven through the foam and into the body of caustic soda solution in the tank it carries the carbon dioxide gas into the foam and into the water, immediately releasing it to operate upon the same in the raw state.

This short period of spraying with carbonated water I have found to be sufficient to entirely reduce any froth or foam existing on the surface 12 of the body of caustic soda solution 11 and to so check foaming that it will not recur to any substantial degree for a period of from one hour to two and one half hours, according to the degree to which the caustic soda solution has become saponaceous.

The great advantage of my invention, therefore, is that with a simple and inexpensive ad-

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dition to apparatus and means already existing in a standard bottling plant, the difficulty with froth and foaming is completely removed.

I claim:

1. In combination with an open-topped tank adapted to hold a body of fluid saponaceous mixture with an exposed normally level surface of substantial area whereon a mass of froth and foam will form from agitation of the mixture, a carbonator wherein carbonic acid gas is caused to be absorbed in water under high pressure to produce carbonated water having excess of such gas over what can be held in solution at atmospheric pressure, said carbonator comprising pressure means for forcing out the carbonated water at high speed, means for conducting such carbonated water from the carbonator to points over considerable areas of said surface and masses of said froth and foam thereon, and means for controlling delivery of said carbonated water effected by the pressure in the carbonator to cause it to be forcibly discharged into said froth and foam over the entire surface of said body of mixture.

2. In combination with an open-topped tank adapted to hold a body of fluid saponaceous mixture with an exposed normally level surface of substantial area whereon a mass of froth and foam will form from agitation of the mixture, a carbonator wherein carbonic acid gas is caused to be absorbed in water under high pressure to produce carbonated water having excess of such gas over what can be held in solution at atmospheric pressure, said carbonator comprising pressure means for forcing out the carbonated water at high speed, piping means connected with the carbonator and having a portion extending over considerable areas of said surface where masses of froth and foam form, and nozzles in said portion formed and positioned so that carbonated water released thereto will be caused by the gas pressure in the carbonator to enter said masses of foam and through said surface of said mixture, whereby carbonic acid gas will be released therein and the foam thereby will be caused to be eliminated and foaming in the mixture to be checked.

3. In combination with an open-topped tank adapted to hold a body of fluid saponaceous mixture with an exposed normally level surface of substantial area whereon a mass of froth and foam will form from agitation of the mixture over the entire surface, a carbonator, a pipe connected with the carbonator and subject to the pressure of carbonic acid gas therein, said pipe extending above the surface upon which said saponaceous masses are held, a multiplicity of nozzles in said pipe turned downwardly therefrom, a valve in said pipe for releasing the carbonated water in the carbonator to be forced by the pressure therein to go through said masses of foam and into the body of the mixture, and means automatically operated to open the valve for predetermined short periods spaced apart for predetermined long periods of time.

4. In combination with an open-topped tank adapted to hold a body of fluid saponaceous mixture with an exposed normally level surface of substantial area whereon a mass of froth and foam will form from agitation of the mixture over the entire surface, a carbonator, fluid conveyor means connected with the carbonator and subject to the pressure of carbonic acid gas therein, said conveyor means being extended above and in close proximity to substantially all parts of said

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surface and of the masses of foam thereon, a valve in the connection of said conveyor means with the carbonator for releasing the carbonated water therefrom to permit it to move through said conveyor means under pressure, a multiplicity of downwardly turned nipples on the conveyor means so positioned as to direct carbonic acid gas sprayed therefrom over all parts of said

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surface and of the masses of foam thereon, and means automatically to open and close the valve, whereby the carbonated water will be driven through any foam on the surface of the solution and into the body of the solution and the excess of carbonic acid gas therein will be freed in the foam and in the body of the solution.

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