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BOTTLE ATTEMPERING APPARATUS FOR BOTTLE WASHERS

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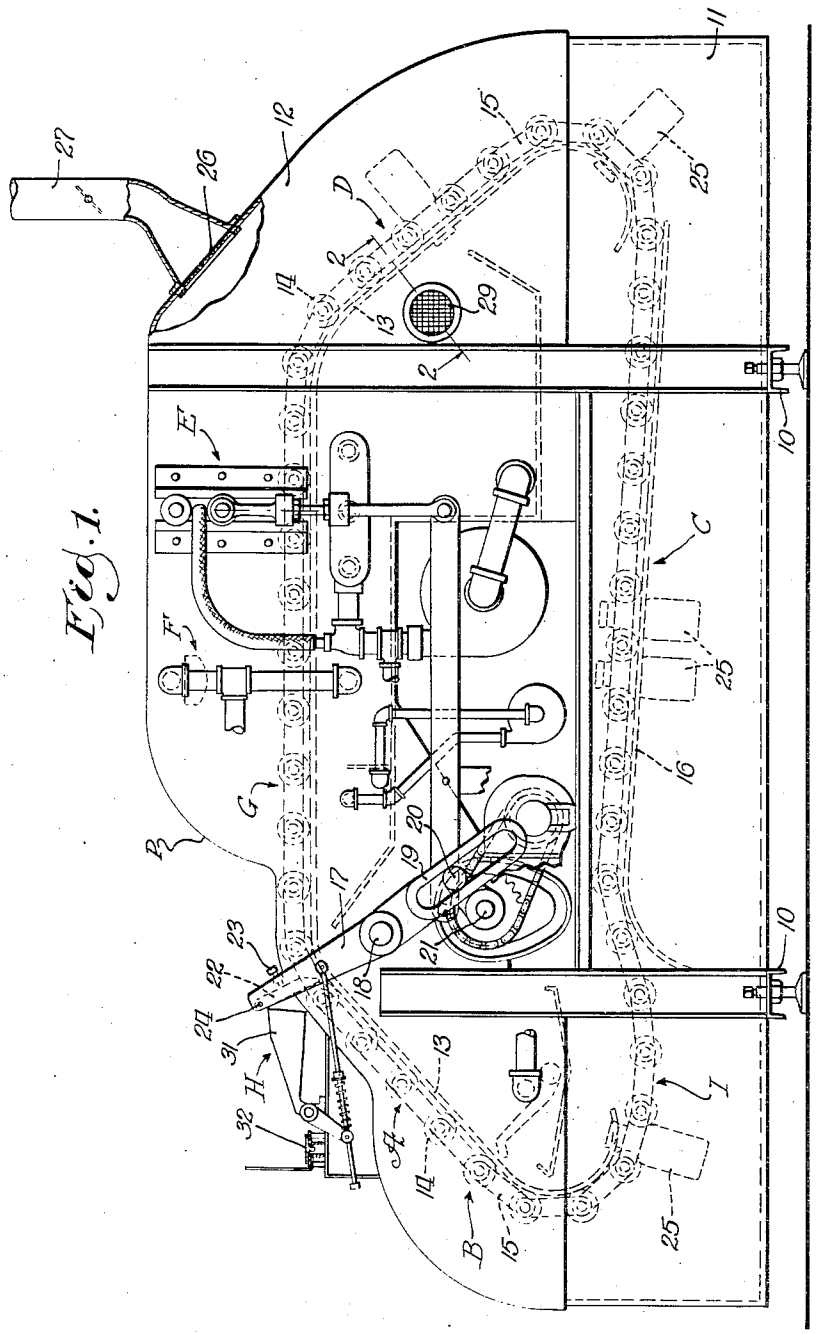


Fig. 1.

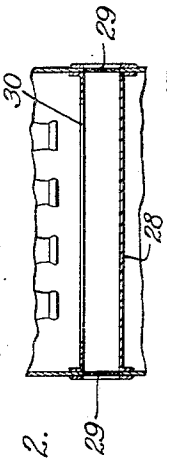


Fig. 2.

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BOTTLE ATTEMPERING APPARATUS FOR BOTTLE WASHERS

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1 Claim. (Cl. 141—7)

This invention relates to improvements in machines for washing bottles or similar containers. More particularly this invention relates to the improvements in bottle washing machines whereby the bottles which are subjected to two or more cleansing operations are also subjected to a current of cool air intermediate the cleansing operations.

This application is a division of our co-pending application Serial No. 141,084, entitled "Bottle washing machinery," which was filed May 6, 1937, and in which application or divisions thereof other novel features of our improved bottle washing machine are fully disclosed and claimed.

In accordance with one feature of the present invention the improved bottle washing machine includes means for subjecting the bottles to several washing operations at different temperatures and means for directing a current of cool air over the bottles while passing from one washing or cleansing operation to another to thereby change the temperature of the bottles during such passage, thus permitting a greater temperature gradient between the several washing or cleansing operations without subjecting the bottles to radical temperature changes to thereby prevent damaging thereof.

It is also within the purview of the present invention to provide a machine for washing bottles or similar containers including washing mechanism having water spraying devices housed in an enclosure provided with a conveyor for bottles or the like, the enclosure being provided with a vent for air circulation to assist in the cooling of the bottles mounted on the conveyor.

In the conventional type of bottle washers it is generally attempted to subject the bottles to successive and frequent washing operations in which the washing solutions vary substantially and greatly in temperatures. Such great variations in temperatures are desirable in that it has been found advantageous, especially in the soaker type of bottle washers, to use a soaking solution of approximately the temperature of boiling water and a final cold rinsing solution, such as tap water.

Obviously the time interval between the passage of the bottles from the soaking solution to the cold final rinse is not normally sufficient to permit the normal cooling of the bottles from the temperature of a boiling soaking solution to the temperature of a cold tap water. In fact the temperature gradient between the boiling soaking solution and the final cold rinse, though somewhat offset by an intermediate attempered wash, is still sufficiently great in the conventional soaker type of bottle washers to frequently cause the breaking of bottles if the time interval between the soaking and the attempered wash of the bottles is not sufficiently great.

In the modern compact bottle washing machines it is undesirable to so construct the apparatus as to permit the travel of the bottles for a sufficiently long period of time during which they are not being subjected to one washing operation or another to facilitate the normal cooling of the bottles. It is, therefore, desirable to introduce into the compact type of bottle washers the necessary provisions to enable the rapid successive treatment of bottles under radically different temperature conditions without subjecting the bottles to excessive temperature shocks. By the provision of such necessary bottle attempering mechanism the normal breaking of bottles may be prevented and yet secure a construction in which the bottles are subjected to frequent washing operations at radically different temperatures, all in a compact bottle washing machine.

It is, therefore, the prime object of this invention to provide novel and improved means for subjecting bottles or similar containers to cleansing operations at radically different temperatures and to provide a novel arrangement for directing air over the bottles or containers intermediate the several cleansing operations to effect a substantial but gradual attempering of the bottles or containers during their passage from one washing operation to another to thereby prevent temperature shocks which would otherwise be incidental to the washing operations with the resultant prevention of breakage of bottles.

The foregoing and other objects, important novel features and advantages of the improvements in bottle washing machines, and the unique combination and arrangement of elements will be more apparent to those skilled in the art upon examination of the description and appended claim together with the drawing. It should be understood that certain changes may readily be made in the herein described invention and yet come within the scope of the appended claim.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which:

Figure 1 is a view showing the improved bottle washer largely in side elevation and partially in section.

Figure 2 is a detail view taken in section along line 2—2 of Figure 1.

Referring to the drawing, in which like numerals are used to identify like elements, 10 represents a support for a soaking tank 11 upon which is erected the top portion 12 of the casing of the bottle washing machine.

At the opposite sides of the casing are provided generally symmetrically arranged upper guides or tracks 13 which may be made of angle-iron to support the rollers 14 of the bottle conveyor 15 which moves the bottles through the various washing operations within the bottle washer. The lower flight of the conveyor 15 is supported on similar guides or tracks 16. The lower flight of the conveyor 15 moves from left to right, as viewed in Figure 1, and the arrangement of the conveyor 15 within the bottle washer casing and the arrangement of the various washing apparatus represent a more or less conventional type of bottle washing machine in which the enclosing casing constitutes a complete enclosure provided with openings at intake and discharge stations for the passage of bottles into and out of the washer and in some instances also provided with air vent openings. Normally such a bottle washing machine is adapted to receive soiled bottles in a substantially inverted position through a bottle passage in the casing at a loading station A to carry them downwardly past a pre-rinsing station B through a soaking zone in tank 11, as indicated at station C, and then carry the bottles upwardly in a partially inverted position for draining, as shown at station D, from where they are carried to the attempered washing station E, cold rinsing station F, sterilizing or chlorinating station G and thence through a bottle passage P in the casing to the unloading station H.

The bottles being washed while travelling through the bottle washer are rigidly supported or carried upon frames or elements (not shown) of the conveyor 15 by means of clamping arms (not shown) which are pivoted to the frames of the conveyor 15 in such a manner that there is a minimum of metallic contact of the clamping arms with the bottles supported thereby. Such arrangement for the clamping and supporting of the bottles promotes the quick heating and cooling thereof as they pass through the various washing, rinsing, heating and cooling operations.

The conveyor 15 is preferably given a step-by-step movement, each step being equivalent to the distance from center to center of the consecutive carrier frames or elements of the conveyor 15. By locating the conveyor chain propelling means immediately adjacent the discharge or unloading station H it is possible to keep all slack out of the chain for the conveyor 15 throughout the upper flight of travel of the conveyor along which are positioned the various washing and cooling mechanisms requiring accurate registration with the bottles to be treated.

The conveyor 15 is advanced by rocking levers 17 positioned on opposed sides of the bottle washer casing. The levers 17 are supported on the rock shaft 18 which extends through the washing machine. One of the levers 17 has a slotted extension 19 engaged by a crank 20 mounted on shaft 21. The two levers 17 are each provided at their upper ends with dogs 22 adjustably limited as to movement in one direction by means of an adjustable stop or set screw 23 but are free to move pivotally in the opposite direction about the fulcrum pins 24 which connect the dogs to the levers 17.

Each of the dogs 22 is in the plane of the rollers 14. When the levers 17 oscillate in a clockwise direction, as viewed in Figure 1, the dogs 22 swing to the left and upwardly to ride over the rollers 14, dropping by gravity behind each roller. During the counter-clockwise oscillation of the levers 17 about the axis of the rock shaft 18 which supports the levers 17 each of the dogs 22 will engage the rear face of the adjacent roller immediately ahead of it and will also and simultaneously engage the dog adjusting stop 23 immediately to the rear of each of the dogs 22 so that the rollers will be propelled ahead by the counter-clockwise movement of the arms or levers 17. By thus securing the movement or advance of the entire conveyor 15 by a pull on the conveyor chain at approximately the position of the discharge station H, all of the slack of the conveyor will occur between the station H and the station I in the soaking tank 11.

As above explained, the arrangement and method by which the conveyor 15 is moved through the various stations of bottle washing operations makes it possible to operate the conveyor in such a manner as to secure the accurate registration of the bottles in the bottle supports (not shown) of the conveyor 15 with each of the washing and treating mechanisms which are included in the bottle washing machine for washing, rinsing, sterilizing and intermediate cooling of the bottles between several of the stations.

Throughout the progress of the conveyor 15 through soaking tank 11 the bottles 25 will be right side up, thereby permitting the ready filling of the immersed bottles with hot soaking solution as the bottles travel through the soaking tank 11. As the bottles 25 approach the station D they will be gradually inverted and drained of their content of hot soaking solution which will then return to the soaking tank 11 leaving the bottles empty and in a partially inverted position.

After the bottles 25 leave the soaking tank 11 and pass the draining station D they are then conveyed or carried into the attempered washing station E where the bottles are subjected to a washing operation prior to the cold rinse at station F. Obviously it is desirable to use very hot water or soaking solution in the soaking tank 11 or at the soaking station C. It is, therefore, advantageous to use an attempered washing solution or water at station E which is of such a temperature as to prevent a radical temperature shock to the bottles 25 when they reach the cold rinsing station F. However, due to the very short travel of the bottles 25 from the station D to the station F it is difficult to withdraw much heat or to secure considerable cooling of the bottles without definite cooling operations.

Since the temperature gradient between the soaking solution in the soaking tank at station C and the washing and rinsing solutions or water at stations E and F is great, it becomes desirable to provide an intermediate attempering or cooling arrangement to cool or attemper the bottles as they pass from the emptying station D to the washing station E. Such an intermediate cooling or attempering of the bottles is preferably secured by circulating cool air into and over the bottles 25 immediately after they have left the station D, thereby withdrawing a considerable quantity of heat from the hot bottles and thereby cooling the same to more nearly approach the temperature of the water at the washing station E.

The circulation of cool air intermediate the stations D and E is secured by providing a vented opening 26 (preferably screen) in the upper por-

tion of the rear wall of the washing machine casing 12. The opening 26 is between the stations D and E and the air current set up by the movement of the conveyor 15 and the action of the washing sprays at the washing stations E and F and the suction effect of the stack 27 operatively connected with the vented opening 26 carry away heated vapors and produce a circulation of cool air into and through the passage P and over the bottles 25 after they leave the station D and before they reach the station E. This arrangement promotes a more rapid cooling of the bottles 25 and enables the use of a hot soaking solution in the tank 11 and a cooler washing water at stations D and F, thereby greatly increasing the effectiveness and efficiency of the bottle washer.

To further cool the bottles 25 in their passage from station D to station E it may be desirable to introduce cool air into the bottle washer casing 12. Normally this is objectionable for it would tend to cool the bottles at stations in the washing machine at which it is not desired to cool bottles. However, in the present improved bottle washer which includes the venting arrangement just described the effect of the cool air is localized upon the bottles between the stations D and E to thereby further pre-cool the bottles which is, of course, desirable. Such localized effect of the cool air entering the bottle washer is accomplished by providing an air duct or vent 28 opening through the sides of the bottle washer casing 12 and provided with screened inlets 29.

Air duct or pipe 28 is slotted in the upper portion of its wall at 30 and is arranged transversely of and immediately below the conveyor 15 between the stations D and E and below the vented opening 26. The duct 28 is further arranged and so positioned that the slot 30 will register with a row of bottles 25 in one of the periods of dwell of the conveyor 15 as the bottles pass from station D to station E.

By this arrangement each of the rows of bottles 25 in each of the frames or carriers of the conveyor 15 will come to rest over the air duct 28 to be cooled by the air passing from the slot 30 of the air duct 28 toward the vent 26 in the casing 12. Thus the cool fresh air replacing that which is vented through the stack 27 is directed into and over the bottles 25 during a period of dwell of the conveyor 15 to effect a rapid cooling of the bottles. Such attempering or cooling of the bottles enables the use of very hot soaking solutions in the soaking tank at station C and very cool washing and rinsing solutions or waters at the washing and rinsing stations E and F.

After the bottles 25 have been carried by the conveyor 15 through the soaking, attempering, washing and rinsing stations they are subjected to a chlorinating or sterilizing operation at station G after which they are discharged from the conveyor 15 at station H. The bottles discharged from the conveyor 15 at station H are discharged onto an automatic bottle inverting and transferring table 31 which in turn erects and places the bottles onto a discharge conveyor 32 which carries the clean sterile bottles away from the bottle washing machine.

In the operation of the improved bottle washer, bottles are supplied in inverted order to the bottle supports of the conveyor 15 at the infeed or supply station A. As the bottles travel with the intermittently moving conveyor 15 they travel through the pre-rinse station B at which point they are subjected to a rinsing action which removes easily removable extraneous matter from the bottles before the bottles enter the soaking tank 11 or operating station C. After the bottles have been subjected to the hot soaking solution in the soaking tank at station C they pass through the inverting and bottle emptying station D where the soaking solution is discharged or emptied from the bottles as they travel toward the attempered wash station E.

In the travel of the bottles from the draining station D to the washing station E the bottles are subjected to a cool current of air which tends to cool them before they enter the washing station E. Such cooling of the bottles is desirable to permit a greater temperature gradient between the temperatures of the hot soaking solution in the tank 11 and the cold washing and rinsing solutions at stations E and F without subjecting the bottles to excessive temperature shocks. After the bottles are thoroughly washed at station E they pass on to a final cold rinsing station F from which, after being rinsed, they are carried to the sterilizing station G and discharged from the bottle washer at the discharge station H.

Obviously the adaptation of the improved bottle attempering or cooling arrangement which involves the circulation of cool air over the bottles between washing stations has been here shown and described only as applied in the preferred embodiment of the invention. However, the principle can well be applied at various stations throughout the bottle washer to thereby permit greater temperature differential between other bottle cleansing operations. In all probability various modifications of the invention can readily be made by those skilled in the art and the invention is, therefore, not to be restricted except in so far as necessitated by the prior art and the spirit of the appended claim.

The invention is hereby claimed as follows:

A bottle washing machine comprising, in combination, an intermittently movable bottle conveyor, a tank for hot soaking liquid, a tank for rinsing liquid cooler than the soaking liquid, a casing substantially enclosing said conveyor and covering said tank for soaking liquid and said tank for rinsing liquid, a bottle passage in said casing to permit the passage of bottles therethrough, said conveyor being so positioned and arranged within said casing as to adapt the conveyor for the movement of bottles along a predetermined path in said casing and through said passage in said casing, a vent means on said casing adapted to induce the flow of air into said casing through said passage and the withdrawal of air from said casing after the flow of the air over bottles being washed in the bottle washing machine, and apertured duct means in said casing adapted to receive cooling air from without said casing and direct cooling air through said aperture into and over bottles being washed in said washing machine upon said bottles having been brought into registry with the aperture in said duct means when said bottles come to rest during intermittent motion of said conveyor while moving bottles from one washing operation to another washing operation, whereby a quantity of heated air is withdrawn from the casing of said washing machine by the flow of air into said passage toward and out of said vent means and cooling air is directed into and over bottles from said duct means to cool bottles intermediate the soaking and rinsing operations.

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