

C. H. LOEW.

PROCESS OF WASHING AND STERILIZING BOTTLES.

APPLICATION FILED JULY 5, 1904.

3 SHEETS-SHEET 1.

Fig. 1.

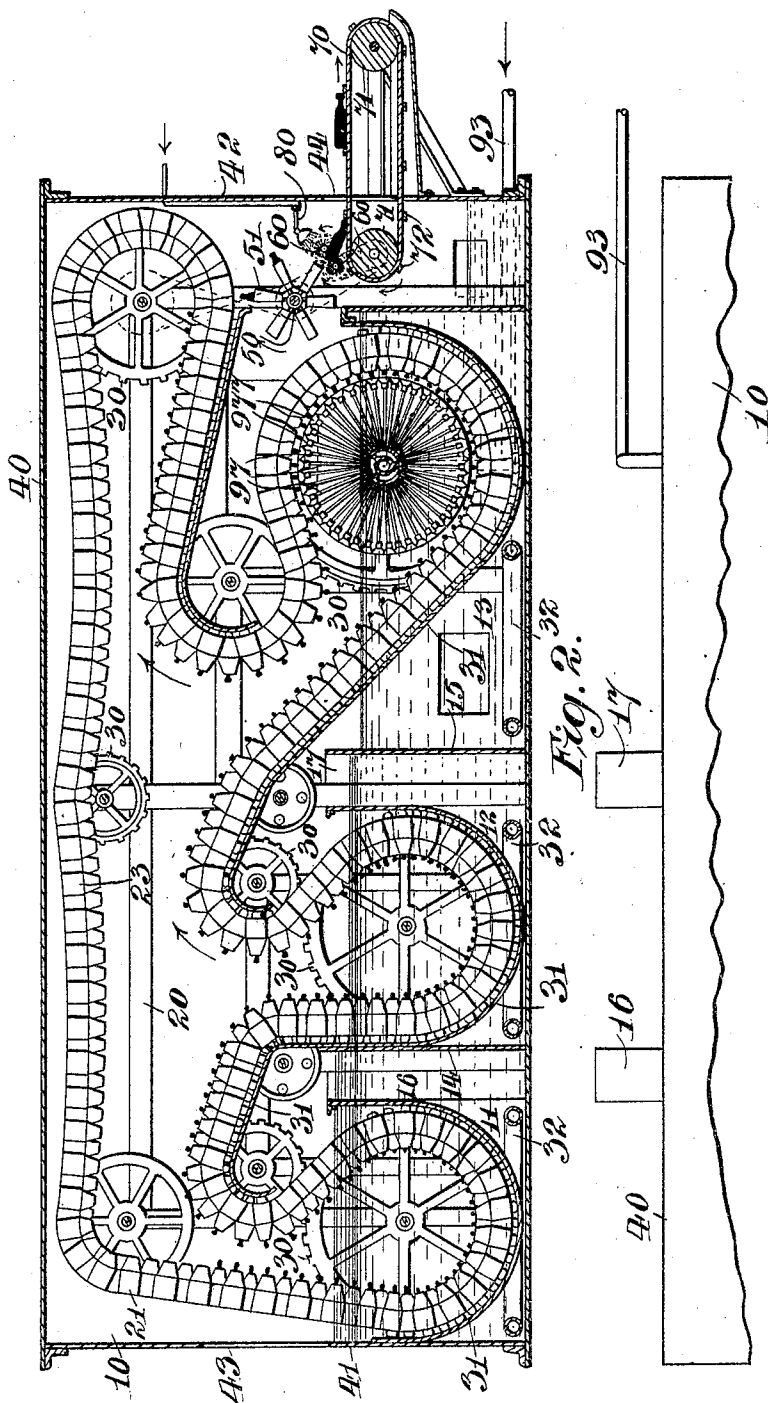


Fig. 2.

Witnesses
 Alan Mc Donnell.
 Beverley Ray Barry.

Charles H. Loew Inventor
 By His Attorney William R. Baird

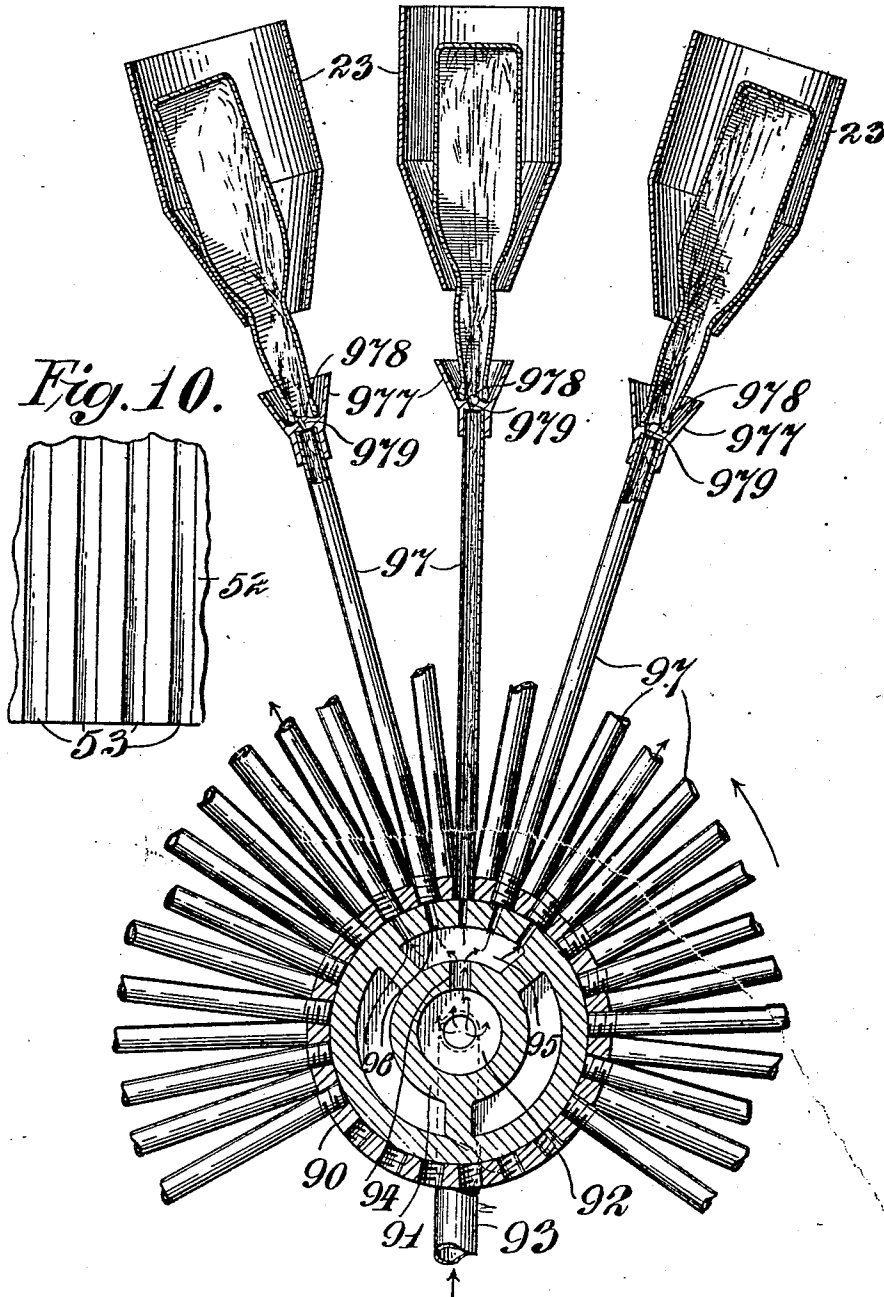
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3 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

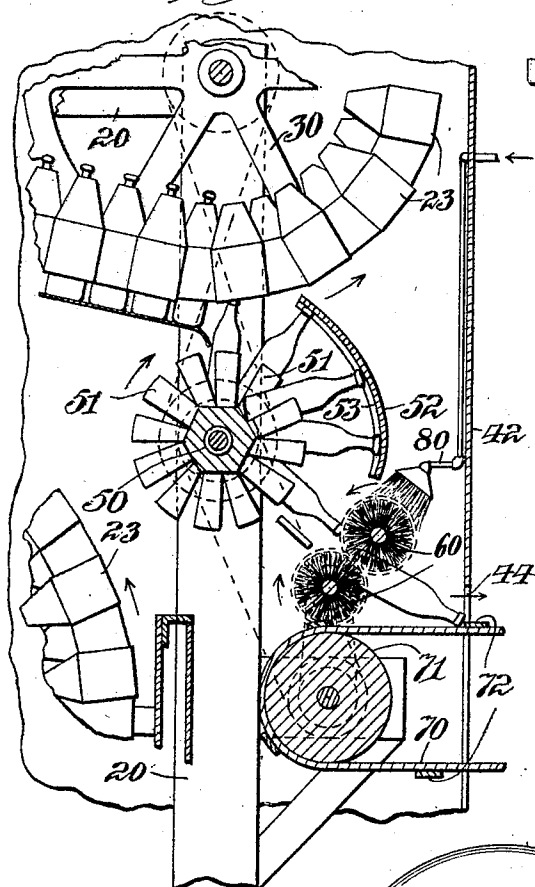


Fig. 5.

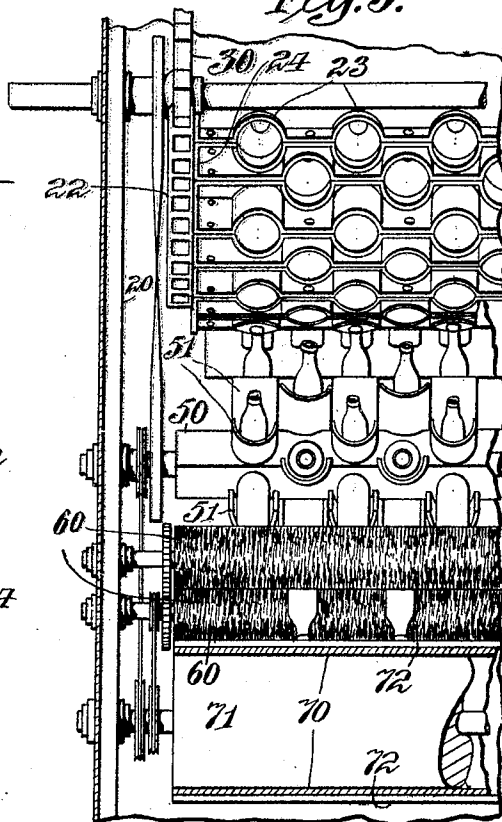


Fig. 6.

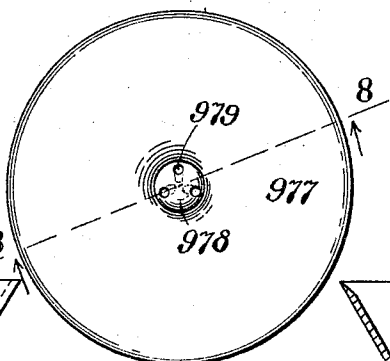


Fig. 7.

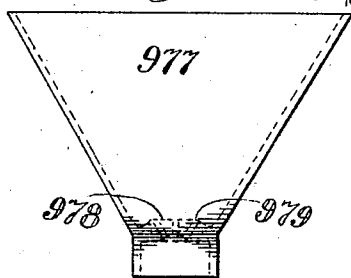


Fig. 8.

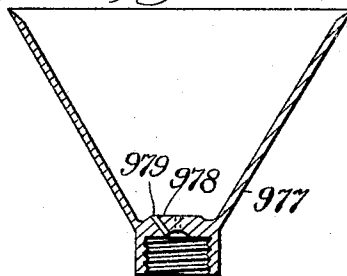
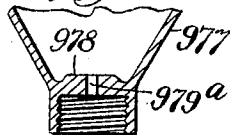


Fig. 9.



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UNITED STATES PATENT OFFICE.

CHARLES HENRY LOEW, OF LAKEWOOD, OHIO.

PROCESS OF WASHING AND STERILIZING BOTTLES.

No. 797,298.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed July 5, 1904. Serial No. 215,420.

To all whom it may concern:

Be it known that I, CHARLES HENRY LOEW, a citizen of the United States, and a resident of Lakewood, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Processes of Washing and Sterilizing Bottles, of which the following is a specification.

This invention relates to a process for washing, sterilizing, and cleansing beer and other bottles; and its novelty consists in the several successive steps thereof.

Bottles which have been employed for the vending of liquids, and more especially beer, when they are returned to the bottler are frequently in a dirty condition. They are used for the storage and transportation of things which they were not intended to contain. They become dirty in a physical and chemical sense. Before they can be used again they must be cleansed, not only to free them from visible substances, but also from substances forming a medium for the transmission or propagation of germs. Freedom from bacteria is essential for a bottle which is to be filled with a fermentable liquid like beer. Washing, soaking, scrubbing, and rinsing have all been employed for the purpose of cleaning bottles of this class; but in the use of all of the devices by which they have been handled while being subjected to these different processes there has been involved also at some stage the actual manual handling of the bottles, and the result has been that no very great degree of heat could be employed in treating the bottles, because they could not be safely or conveniently handled while hot without causing some injury to the workman. It is well recognized that water is the best cleansing agent for the removal of impurities and that heat is the best agent for securing the sterilization and disinfection of any material like glass; but heretofore the difficulties above referred to have prevented the use of both agencies in an effective way.

Continued soaking in water, and especially in water which has been treated with alkali, will remove in most cases all of the mechanical impurities which have been brought into contact with bottles. In order, however, to absolutely insure safety, the danger of subsequent infection should be provided against and means should be employed not only to remove all deleterious substances which might remain even after prolonged soaking, but also to provide such means that such substances

would themselves be rendered innocuous, and this process accomplishes the desired result in a thorough and economical manner.

In brief, the improved process consists, first, in passing the bottles slowly through a bath of water to which has been added a sufficient amount of alkali, as caustic soda, to make a five-per-cent. solution, and which bath is maintained at a temperature of about 135° Fahrenheit. The bottles are next reversed, so as to empty their contents back into this bath, and are then carried slowly through a second similar five-per-cent. alkaline solution, the temperature of which is maintained at about 160° Fahrenheit. The bottles are again reversed, so as to empty their contents back into this bath. The bottles are next carried through a third bath of sweet water containing no alkali, but the temperature of which is maintained at about 175° Fahrenheit. In this bath all traces of the alkali which might adhere to the glass are dissolved, and thus removed. While yet in this bath the bottles are reversed and emptied and then, although not removed from the conveyer in which they have been caused to travel through these different baths, they are brought in front of a mechanism whereby they are internally subjected to the action of jets of sweet water at a temperature of about 200° Fahrenheit. They are next carried over the sweet-water bath, so that their contents may be emptied therein. They are then dropped from the conveyer which has brought them so far and are reversed, so as to be brought beneath a sprinkler, where they are subjected to the action of a spray of relatively cool water, say at from 60° to 100° Fahrenheit. While being so sprinkled, they are caused to be passed between revolving brushes, whence they fall upon a second conveyer and are automatically transported by this conveyer to the filling-machine. From the time when they are first put into the apparatus referred to until the time of their delivery to the brushing mechanism each bottle is inclosed in a pocket whereby it is shielded from currents of air carrying possible infection and tending to lower its temperature at improper points in the line of its travel.

By this process it will be observed the bottles have been subjected to the action of alkaline solutions and rinsing solutions at successively-increasing temperatures until they are finally rinsed internally by water in motion at a temperature at 200°, whereby their thorough and complete sterilization is effected. The

whole travel of the bottles is within a chamber inclosing the apparatus and while not actually in the solution is through the bath of vapor formed above such bodies of liquid, so that substantially little cooling takes place until they emerge from the internal rinsing device, and the cooling which then takes place from the temperature of 200° downward is very gradual.

A preferred form of apparatus suitable for employment in carrying out this invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical central section thereof. Fig. 2 is a plan view of one side of the tank shown in Fig. 1. Fig. 3 is an enlarged section of the rinsing-wheel. Fig. 4 is an enlarged detail of part of Fig. 1. Fig. 5 is an end elevation of part of the mechanism shown in Fig. 4. Fig. 6 is a top plan view of the rinsing-wheel cup. Fig. 7 is a side elevation of the same. Fig. 8 is a section on the plane of 8 8 in Fig. 6. Fig. 9 is a section of a modified form of the rinsing-spoke cup, and Fig. 10 is an enlarged detail of the reversing-wheel guard.

In the drawings there is illustrated a large tank 10, divided vertically into compartments 11, 12, and 13 by means of partitions 14 and 15. The tank and its compartments are made of any suitable material and of any convenient size and shape. Offsets 16 and 17 are provided, so that the labels and dirt may be readily removed. Arranged above the compartments and in convenient relation thereto is a framework 20, adapted to support an endless bottle-conveyer 21, consisting of a pair of endless chains 22, one mounted in a vertical plane on each side of the apparatus and supporting between them rows of transverse bottle-holders, each consisting of pockets 23, suitably arranged in series and secured to the endless chains 22 by means of lugs 24. The pockets 23 are open at each end and wider at one end than the other, so as to contain the bottles bodily and loosely, but securely. Adjacent series of pockets are arranged staggered, so that a great number of such pockets may be placed in a relatively small space. The conveyer is supported upon and actuated by a series of sprocket-wheels 30, mounted upon the frame of the machine at suitable places and which are propelled from a suitable source of power. (Not shown.) As at certain portions of their travel the entrance side of the bottle-pockets 23 are open and downward and the bottles contained therein are therefore liable to fall out, guards 31 are provided, on which the bottles ride at such points and are thus prevented from dropping from the carrier.

The compartments 11, 12, and 13 are provided with any suitable means for heating their contents, such as steam-pipes 32. Such means are not strictly necessary because the solutions contained in the tanks may be heated before

being delivered thereto; but the most practical way is to supply the compartments with steam-pipes and with suitable thermostatic apparatus, whereby the temperature within each compartment can be maintained automatically within a predetermined range. These pipes and thermostatic devices are not shown in the drawings, because their construction is well known to persons skilled in the art, and they form no part of my invention; but they may be placed at any convenient position within the compartments, so as not to interfere with the operation of the conveyer.

Secured above the moving parts of the apparatus is an inclosing hood 40 with depending sides 41 and 42, which may conveniently form parts of and be made integral with the supporting-frame. Suitable apertures 43 and 44 are provided in the hood for the entrance and discharge of the bottles.

Near the delivery end of the apparatus and at such a convenient position as to receive the bottles as they successively drop by their own weight from the endless conveyer is a reversing-wheel 50, geared to the actuating mechanism of the apparatus and timed in its rotation so as to receive in its pockets 51 the bottles as they are dropped from the conveyer, a guard 52, provided with grooves 53 to engage the heads of the bottles, serving to guide them in their movement at this point. The pockets 51 are staggered to correspond with the pockets of the conveyer.

Beneath and in front of the reversing-wheel 50 are arranged two or more rows of brushes 60, also actuated from a suitable source of power and timed to move in unison with the other parts. Below and in front of the brushes 60 is arranged a small endless conveyer, consisting of an apron 70, mounted upon rolling supports 71 and provided with cross slats or guards 72. Above the brushes is arranged a sprinkling apparatus, consisting of a pipe 80, suitably apertured and supplied with water from a source of supply (not shown) and from the apertures in which are projected jets of water upon the bottles while they are in the vicinity of the brushes referred to. A guard may be placed in front of the reversing-wheel to guide the bottles between the brushes if its use is found convenient.

A rinsing-wheel is mounted within the compartment 13. It comprises a central hub 90, which is mounted to rotate upon a fixed bearing 91, which is provided with a hollow center 92, constituting a pipe which communicates with another pipe 93, through which there is delivered to the bearing 91 a supply of water under pressure heated to a temperature of 200° or thereabout. A conduit 94 leads from the center 92 to an upper segment 95, which in turn is provided with a number of discharge-apertures 96. Hollow spokes 97 are secured to the hub 90, which is provided with threaded apertures to receive them.

These latter apertures register with the apertures 96 in the bearing 91. The spokes 97 are provided at their upper extremity with cups 977, each having at its bottom a centering-cone 978, small apertures 979, or a small aperture communicating from the cone to the interior of the spoke 96. As the hub and its spokes revolve the latter registering in succession with the apertures 96 communicate with the segment 95, and as each spoke is brought in line with such an aperture a jet of water from the supply under pressure within the segment 95 is projected upward through the cone 978 into the bottle which it is designed to place within the cup 977, its mouth resting upon the cone 978. As the rinsing-wheel continues to revolve, however, its spokes cease to register with the discharge-apertures in the bearing, and the water is cut off until another aperture is reached, when a jet is again projected upward through each spoke and into the bottle. In the apparatus illustrated this rinsing occurs five times.

In Fig. 9 there is illustrated a modified form of the rinsing-wheel cup 977, in which the cone 987 has but one central aperture 979^a. This in practice is usually quite sufficient.

The method of using this apparatus will probably have been understood from the description above referred to; but in order that it may be made very clear the course of a bottle throughout the apparatus while it is undergoing the several successive steps of the process will now be outlined. The operator stands outside of the wall 41 of the hood 40 and puts the bottles bottom upward into pockets 23 as they pass downward in front of him into the compartment 11. The conveyer moves slowly downward at this point and carries the bottles with it, the bottles riding upon the guard 38 whenever the position of the pockets is such as to compel them to do so. This compartment is filled with a five-per-cent. caustic-soda solution heated to about 135° Fahrenheit. The bottles are then reversed by the continued movement of the conveyer around the wheel at the end of the compartment, so that their necks point downward, and they thus automatically empty themselves. They pass on up into the air, or rather into the body of vapor above the compartments 11 and 12, and thence slowly down and through the compartment 12, which contains a five-per-cent. soda solution heated to a yet higher temperature, about 160° Fahrenheit. They are again reversed and emptied and carried up into the bath of vapor above the compartments 12 and 13. By this time they will have received a thorough soaking, and practically all of the dirt, labels, &c., adhering to them will be removed. The continued travel of the conveyer brings them down into the compartment 13. This contains sweet water heated to a higher temperature of about 175°. Moving around the sprocket-wheel at the end of this

compartment they are then reversed and emptied and are then brought into contact with the rinsing-wheel, where five times in succession jets of water under pressure at a temperature of 200° Fahrenheit are projected into them. The rate of travel of the conveyer is timed so that ten minutes' soaking, or thereabout, should be secured to the bottles in each compartment, and by this time every trace of the alkali has been removed from the bottles, and they are thoroughly cleansed by the alkali and sterilized by the heat and are clean within and without. Nevertheless, as an extra precaution they are finally subjected to an external scrubbing process. Still continuing in the conveyer they are carried away from the rinsing-wheel with their mouths downward, so that practically all of the water is drained therefrom, and are then reversed with their mouths upward until they reach the point where the guard upon which they have been riding terminates and permits them to drop upon the reversing-wheel 50. It will be observed that during this portion of their travel with their mouths upward the heat yet inside of the bottles will cause a constant outflow of hot vapor therefrom, so that it is impossible for any air carrying germs or infectious material to find an entrance therein. Dropping onto the reversing-wheel they are turned over mouth downward, so that their mouths come in between the row of brushes 60, while at the same time, if desired, they receive a shower-bath of water at a temperature of about 100° Fahrenheit from the sprinkling apparatus 80. As they are drawn forward between the row of brushes the mouth of each bottle falls upon the conveyer-belt 70 and rests against one of the cross-slats 72. The rate of travel of this belt is so arranged that the forward motion of the bottle is retarded, and it is kept in contact with the brushes longer than it would if it were free to move between them. Finally, however, the motion of the conveyer carries the bottle away from the apparatus to the filler, which should be located sufficiently near to prevent the infection of the bottles while traveling thereto.

An important but secondary result secured by the treatment above described is a marked improvement in the bottles, due to the progressive heating and subsequent slow cooling in the bath of hot vapor to which they are subjected. In other words, this series of steps results in the practical annealing of the glass of the bottles and renders them much less liable to accidental fracture than before they had undergone such treatment.

It will be understood that while the temperatures in the different baths above referred to are such as have been found efficient in practice, yet variations may be made therefrom within reasonable limits. Likewise, the degree of alkalinity of the soaking solutions may be varied and the number of the solutions in-

creased or diminished without departing from the principles of the invention.

The several successive steps of the process may be carried out obviously in different forms of apparatus than that described, and possibly a skilled workman might vary the form above outlined in many material respects; but such form is compact and efficient and seems to be about as economical as any.

What I claim as new is—

1. The process of washing and sterilizing bottles, comprising the following steps, namely, subjecting them to the action of an alkaline solution heated to about 135° Fahrenheit, then to a second alkaline solution heated to about 160° Fahrenheit, then to a sweet-water bath heated to about 175° Fahrenheit, then to internal jets of water heated to about 200° Fahrenheit, then passing them through a warm vapor which allows them slowly to cool and finally brushing them externally while draining.

2. The process of washing and sterilizing bottles, comprising the following steps, namely, subjecting them to the action of a hot alkaline bath, then to a bath of sweet

water at a higher temperature, then spraying them internally with jets of sweet water heated to near the boiling-point, then cooling them very gradually and scrubbing them externally while draining.

3. The process of washing and sterilizing bottles, comprising the following steps: subjecting them to the action of a hot alkaline bath, then to a bath of sweet water at a higher temperature, then spraying them internally with jets of sweet water heated to near the boiling-point, then cooling them very gradually and scrubbing them externally while draining, the whole conducted under conditions of exclusion of the outer air whereby, while out of the solutions, the bottles are enveloped in the vapors arising therefrom and are not suddenly chilled or infected.

Witness my hand this 20th day of June, 1904, at the city of Cleveland, in the county of Cuyahoga and State of Ohio.

CHARLES HENRY LOEW.

Witnesses:

E. L. HARMON,
LOTTA SMIEDEL.