Jan. 24, 1939. J. P. HEIL ET AL 2,144,800

PASTEURIZER

Filed Dec. 24, 1937 4 Sheets-Sheet 1

Fig. 1.

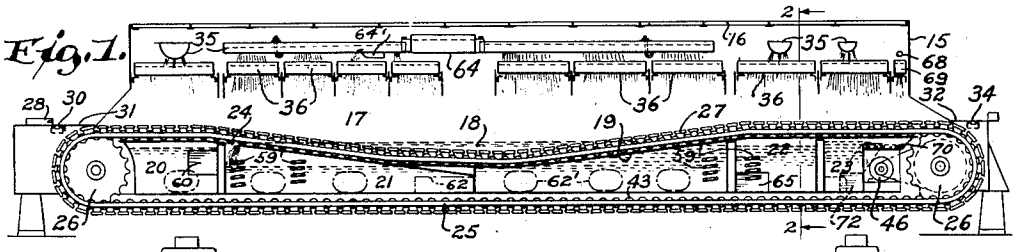


Fig. 2.

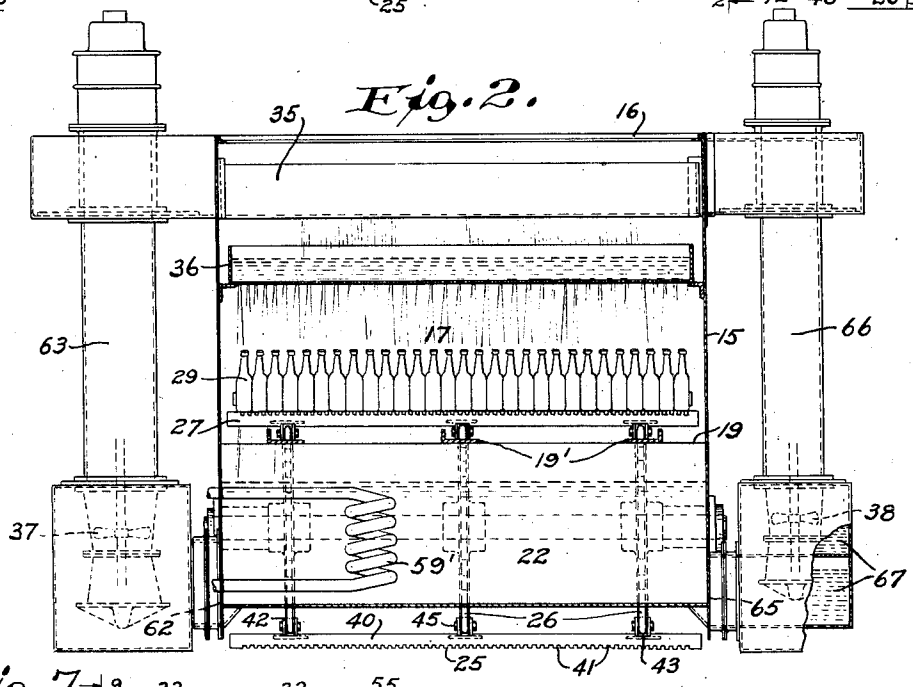
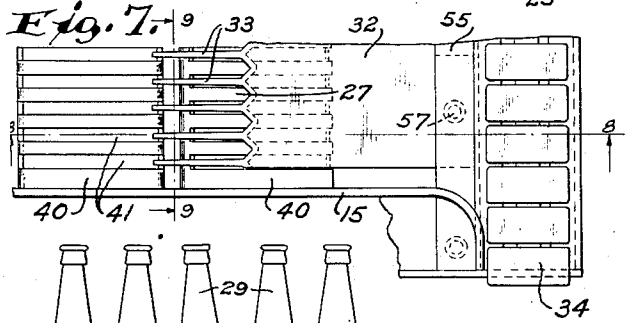


Fig. 7.



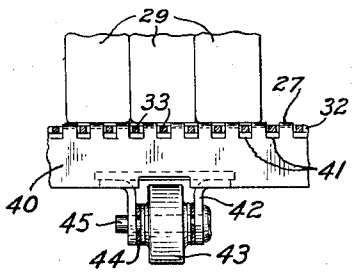


Fig. 9.

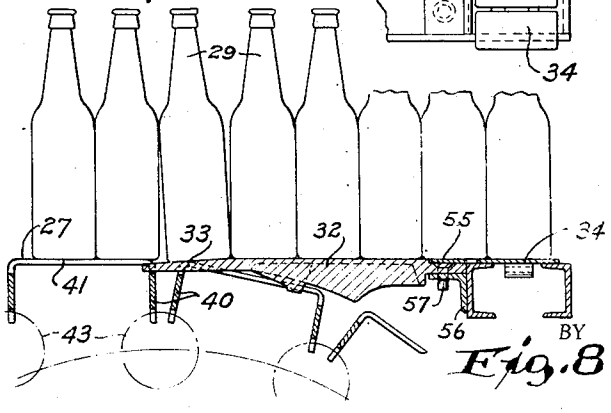


Fig. 8.

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PASTEURIZER

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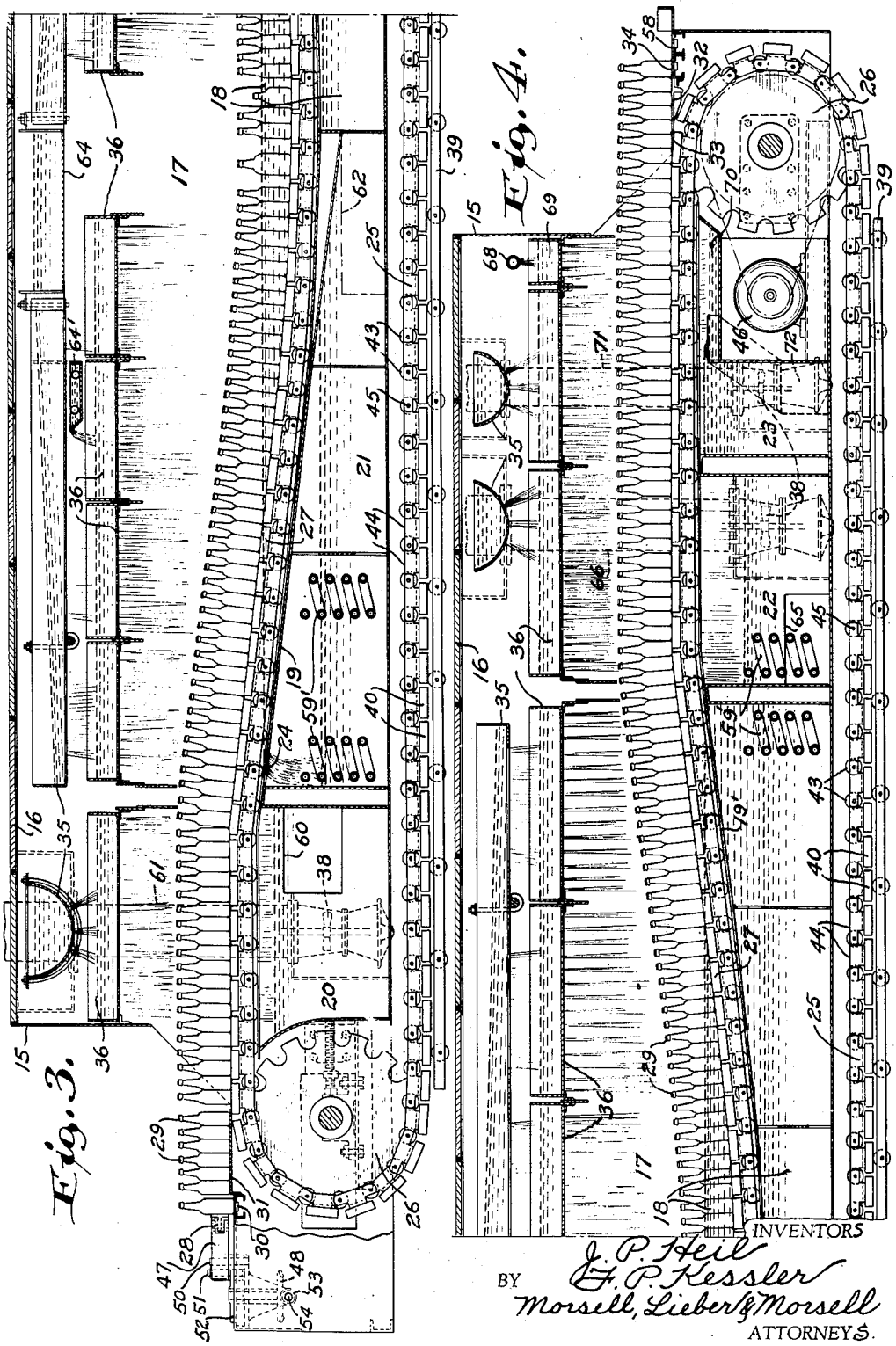


Fig. 3.

Fig. 4.

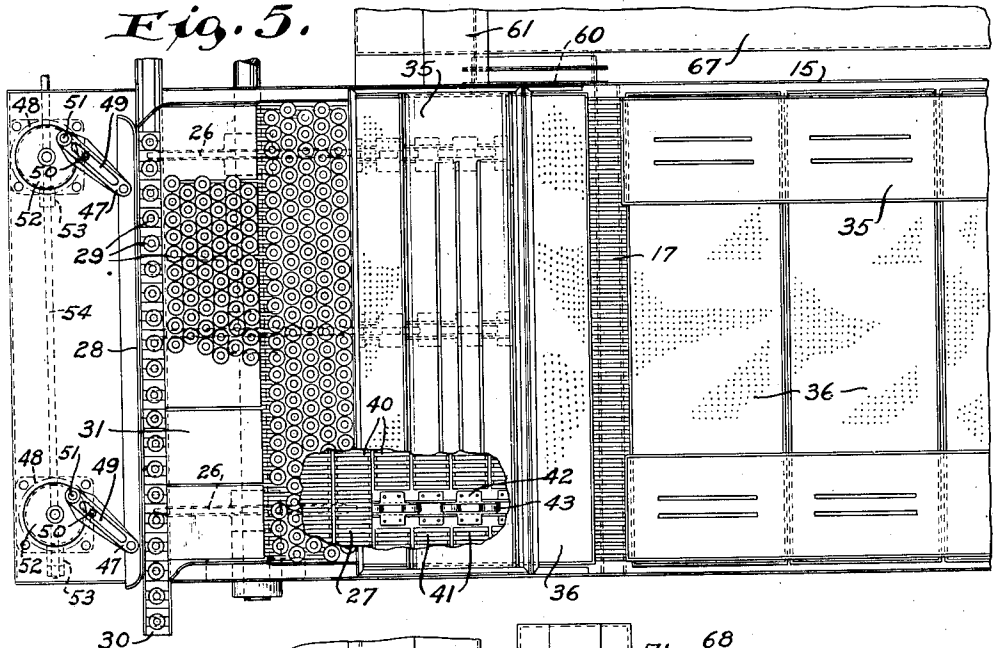
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PASTEURIZER

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Fig. 5.



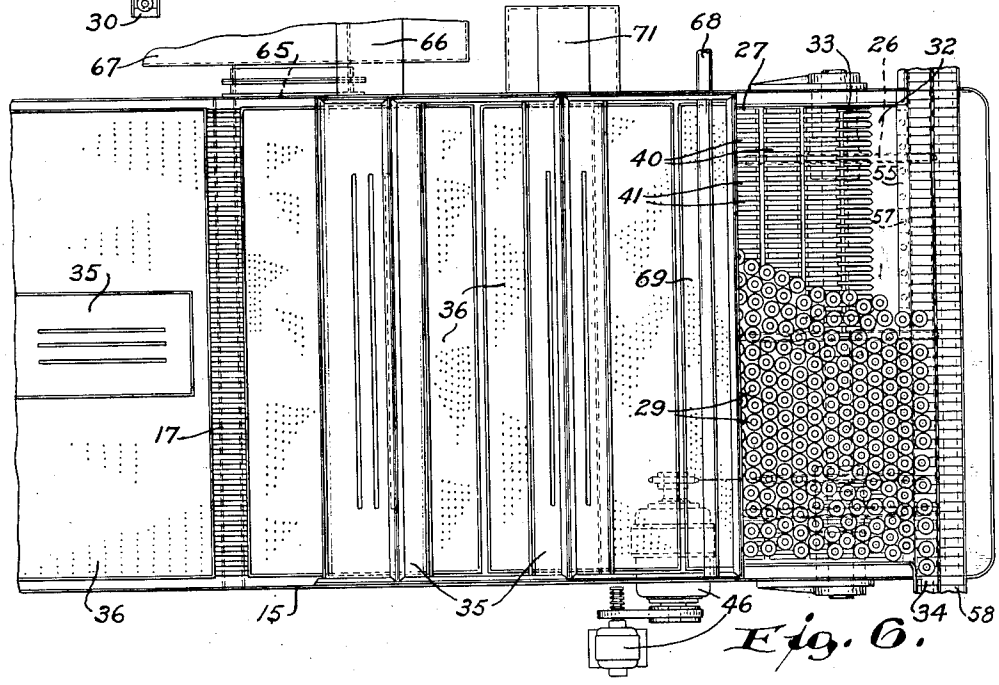


Fig. 6.

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Fig. 10.

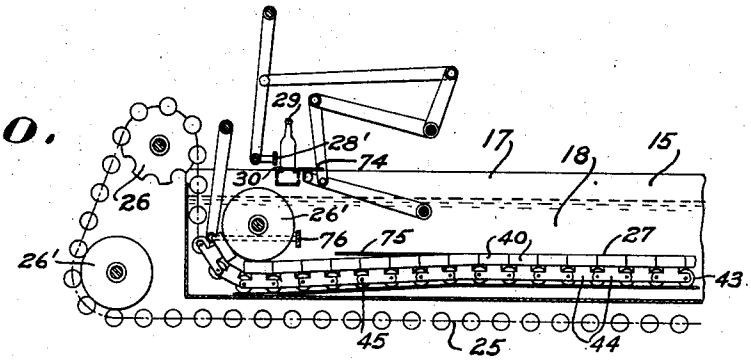


Fig. 11.

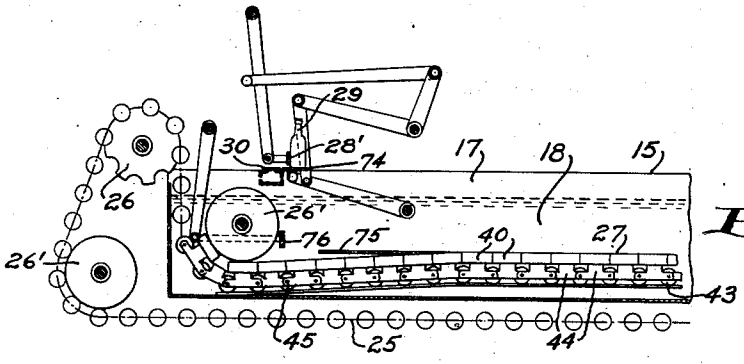


Fig. 12.

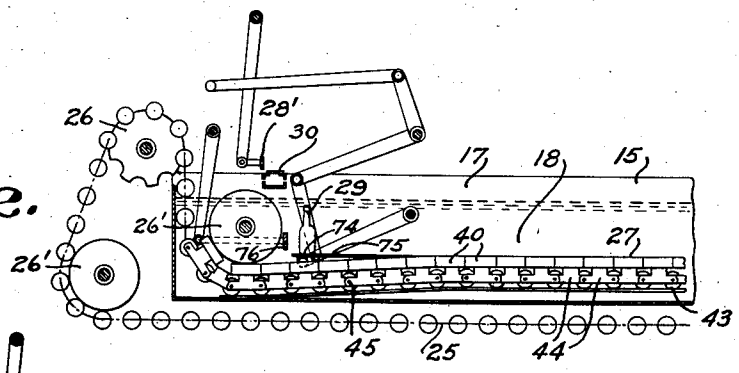
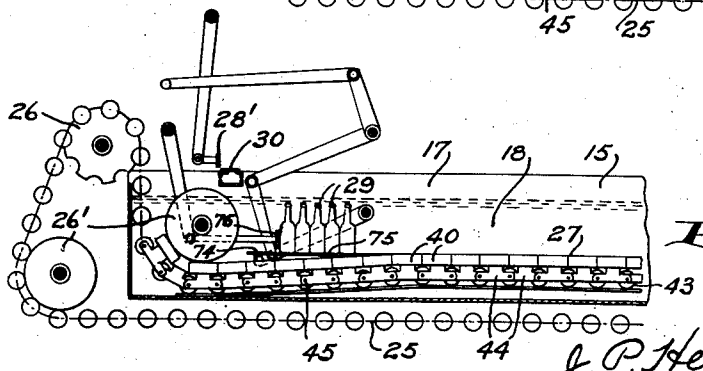


Fig. 13.



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UNITED STATES PATENT OFFICE

2,144,800

PASTEURIZER

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Application December 24, 1937, Serial No. 181,584

2 Claims. (Cl. 126—272)

Our invention relates generally to improvements pertaining to the art of heat treating commodities, and relates more specifically to improvements in the construction and operation of automatically functioning pasteurizers for treating fluent substances such as beer, confined in batch containers such as bottles or cans.

Generally stated, an object of this invention is to provide an improved continuously functioning pasteurizer which is relatively simple and durable in construction, and which is also highly efficient in operation.

It has heretofore been common commercial practice in the art of pasteurizing beverages such as beer, to subject the loaded bottles or cans to the action of hot water within an enclosure, while the containers were being advanced in succession through the heat treating chamber. In some of these prior pasteurizing machines, the receptacles were transported in succession along relatively irregular paths, while in others they were conveyed en masse and in upright position through a relatively long heating zone by means of the upper horizontal stretch of an endless conveyor. While the latter type of machines have become quite popular because of the fact that the horizontal conveyors may be conveniently loaded and unloaded, the prior machines of this type required the use of a rather long enclosure because the containers are subjected to the action of hot water spray alone and are not immersed in hot liquid; and this method is not only objectionable because of the long treating chamber required, but also because all of the product is not uniformly heated. The necessary complications involved in the construction of the other types of pasteurizers wherein the receptacles are conveyed along irregular or tortuous paths, and in some of which immersion of the containers is utilized in order to insure uniform treatment, has however induced the purchasing public to accept the simpler and less efficient straight line conveying type of machine.

It is therefore a more specific object of our present invention to provide an improved machine wherein the commodity laden containers are automatically advanced en masse and in substantially upright position through a heating zone, and are subjected to both liquid spray and immersion in liquid during the treatment.

Another specific object of the invention is to provide an improved heat treating assemblage wherein loaded beverage containers such as bottles or cans are transported through the heating zone while resting upon the upper stretch of an endless conveyor, and having means for most effectively delivering the receptacles to and from the opposite ends of the advancing conveyor stretch.

A further specific object of our invention is to provide an improved automatically functioning pasteurizer especially adapted for the treatment of beer laden bottles, which will effectively handle bottles of various sizes and shapes without danger of breakage.

An additional specific object of the invention is to provide a relatively simple and compact pasteurizing assemblage which may be installed and operated at moderate cost, and which will uniformly and effectively heat treat the commodity passing therethrough.

These and other objects and advantages of our present invention will be apparent from the following detailed description.

A clear conception of the several features constituting our present invention, and of one embodiment of the improvements applied to a beer bottle pasteurizer, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views:

Fig. 1 is a diagram showing a complete pasteurizer for bottled commodity such as beer;

Fig. 2 is an enlarged transverse vertical section through the discharge end portion of the pasteurizer, taken along the line 2—2 of Fig. 1;

Fig. 3 is a similarly enlarged longitudinal vertical section through the front half of the pasteurizer;

Fig. 4 is a likewise enlarged longitudinal vertical section through the rear half of the same pasteurizer;

Fig. 5 is a top view of the front or loading portion of the pasteurizing assemblage, with the closure cover removed and a portion broken away so as to reveal the conveyor structure;

Fig. 6 is a top view of the rear or discharge portion of the pasteurizer, with the closure cover removed;

Fig. 7 is a further enlarged top view of a fragment of the container unloading assemblage;

Fig. 8 is a similarly enlarged longitudinal vertical section through the fragment of the unloading assemblage of Fig. 7, taken along the line 8—8;

Fig. 9 is a likewise enlarged transverse vertical section through the conveyor and unloading structure, taken along the line 9—9 of Fig. 7;

Fig. 10 is a diagrammatic side view of a modi-

fied type of container loading structure, showing the parts in initial bottle admitting position;

Fig. 11 is a similar view of the modified structure showing the bottle moved onto the lowering rig, but still elevated;

Fig. 12 is another similar view of the modified assemblage, showing the bottle lowered into the pasteurizing liquid basin, but still on the lowering rig; and

Fig. 13 is still another similar view of the modified assemblage showing the bottle ejected from the lowering device and about to be moved toward the conveyor with other bottles.

While our invention has been shown and described herein as being embodied in a pasteurizing assemblage especially adapted for the treatment of bottled goods such as beer, and utilizing heated water as a treating medium, it is not the intent to thereby unnecessarily restrict the scope or utility of the improvement.

Referring specifically to Figs. 1 to 9 inclusive of the drawings, the improved pasteurizing assemblage shown therein comprises in general a main casing 15 provided with a sectional removable closure cover 16, and having an enclosed heating zone or chamber 17 and a liquid basin 18 therein; a transverse horizontal partition 19 spanning the interior of the casing 15 to form the basin 18 and to provide a series of lower liquid receiving ducts or chambers 20, 21, 22, 23 of which the chamber 21 communicates with the front end of the basin 18 through overflow openings 24; an endless bottle conveyor 25 operable by means of end sprockets 26 and having an upper substantially horizontally movable stretch 27 resting upon and movable along the partition 19 and rails 19' and through the chamber 17 and basin 18; mechanism including a laterally movable pusher bar 28 for delivering successive rows of upright beer laden bottles 29 from a transverse supply conveyor 30 upon fixed supporting plates 31 coacting with the front receiving end of the conveyor stretch 27; other mechanism including a resiliently mounted supporting plate 32 having a series of parallel fingers 33 cooperating with the delivery end of the conveyor stretch 27 to discharge the heat treated bottles 29 onto a transverse delivery conveyor 34; a series of slotted and perforated troughs 35, 36 located in the upper portion of the chamber 17 and above the basin 18 for spraying liquid over the bottles 29 being transported by the conveyor 25; and a plurality of pumps 37, 38 for constantly circulating treating liquid from the chambers 20, 21, 22, 23 and through the troughs 35, 36.

The main casing 15 may be formed of sheet metal and should be provided with a number of sight openings, and the inlet and discharge ends of the treating chamber 17 should preferably be closed as much as possible without however interfering with ingress and egress of the upright bottles 29. The transverse partition 19 which forms the chamber 21, is imperforate except for the overflow openings 24 so that the entire basin 18 has a substantially constant depth of liquid therein; but the rails 19' which are located above the chambers 20, 22, 23 are separated by large openings and merely provide supports for the conveyor and permit free entry of liquid to these chambers from above. The division plate or partition 19 is transversely horizontal but has a slightly inclined longitudinally extending front portion, the inclination of which is not however sufficient to disturb the upright disposition of the advancing bottles 29 even if these bottles be tall and slender, and the bottles 29 may be of various types as indicated in Fig. 3.

The endless conveyor 25 which coacts with the rails 19', partition 19 and with a lower elongated roller guide 39 as illustrated in Figs. 3 and 4, comprises a series of elongated slats 40 each having a plurality of equally spaced parallel grooves 41 extending thereacross in alinement with the grooves of the adjoining slats 40; brackets 42 secured to the slats 40 and having rollers 43 journaled thereon; and links 44 connecting the successive roller bearing pins 45 so as to provide a flexible endless carrier. One or more of the sprockets 26 may be drivingly connected to a driving unit 46 so as to cause the upper bottle supporting stretch 27 of the conveyor 25 to constantly advance through the chamber 17 and basin 18 at a relatively slow speed just sufficient to insure proper pasteurization of the product confined within the bottles 29, as the latter are transported en masse through the treating zone.

The loading mechanism for automatically transferring the successive rows of bottles 29 in upright position from the supply conveyor 30 to the supporting plates 31 and from thence upon the upper conveyor stretch 27, is shown in detail in Figs. 3 and 5. The pusher bar 28 of the loading mechanism is intermittently movable parallel to and across the upper surface of the bottle supply conveyor 30, by means of a pair of parallel levers 47 the opposite corresponding ends of which are swingably attached to the bar 28 and to gears 48 respectively. The intermediate portions of the levers 47 are provided with slots 49 which coact with fixed pins 50, and the ends of the levers remote from the bar 28 are secured to the gears 48 by crank pins 51 carried by disks 52 which are rigidly attached to these gears. The two bevel gears 48 are adapted to be rotated in unison by pinions 53 mounted upon a common drive shaft 54, and when the gears 48 are so rotated, the revolving crank pins 51 will periodically swing the levers 47 about and slide them along the fixed pins 51 to thereby cause the pusher bar 28 to push any bottles 29 resting upon the conveyor 30 onto the adjacent fixed plates 31. As subsequent rows of bottles 29 are thus pushed onto the plates 31, the mass of upright bottles is gradually advanced over these plates, and is deposited upon the advancing conveyor stretch 27 which thereafter moves the bottles 29 through the heat treating zone or chamber 17.

The unloading mechanism for automatically transferring the bottles 29 in upright position from the conveyor stretch 27 to the final discharge conveyor 34, is shown in detail in Figs. 7, 8 and 9, and as previously stated this mechanism includes the discharge plate 32 having integral parallel fingers 33 extending in the direction of movement of the conveyor 25. The plate 32 while being relatively fixed in position, is resiliently or loosely suspended at its rear end between a thin top plate 55 and a fixed lower angle bar 56 by means of loose rivets 57, thereby permitting the fingered end of the plate 32 to swing up or down to a slight extent. The fingers 33 of the plate 32 are adapted to ride in the alined slots 41 of the successive conveyor slats 40, and the bottles 29 are effectively transferred from the moving conveyor stretch 27 onto the fingers 33, and are subsequently pushed across the plate 32 and onto the conveyor 34 by other bottles 29. The conveyor 34 should be operated at a speed sufficient to re-

move the successive rows of bottles delivered thereto; and a second conveyor 58 such as shown in Fig. 6 and operable at the same or at a different speed, and in the same or in the opposite direction, may also be utilized.

The spray producing assemblage comprising the slotted upper troughs 35 and the perforated lower pans or troughs 36, is best disclosed in Figs. 2 to 6 inclusive, and in the pasteurizer shown, there are several independent liquid circulating systems. At the front end of the heating chamber 17, the liquid collecting chamber 20 has an outlet opening 60 communicating with one passage in a conduit 67, the other passage of which connects with a vertical duct 61 having a pump 38 therein, and the upper end of this duct 61 communicates with one end of the longitudinally slotted semi-circular trough 35 extending transversely across the uppermost portion of the casing 15. Directly beneath this slotted semi-circular trough 35, is a perforated pan or trough 36, and the warm liquid delivered through the perforations of this pan, is sprayed downwardly over the entering and constantly advancing bottles 29 as illustrated in Fig. 3, and subsequently falls back into the lower chamber 20. The long slots in the bottom of the semi-circular upper trough 35, serve to uniformly distribute the inflowing liquid over the entire interior of the pan trough 36, so that all of the bottles 29 are subjected to uniform initial heating.

At the intermediate portion of the machine above the basin 18 and lower elongated chamber 21, there are several upper distributing troughs 35, and lower perforated pans or troughs 36. The lower closed chamber 21 which receives the overflow liquid from the basin 18 through the openings 24 in the partition 19, may be provided with several heaters 59', and has one or more outlet openings 62, 62' at the side of the casing 15 opposite to the conduit 67, which communicate with a vertical duct 63 having the pump 37 therein. The upper end of the duct 63 communicates with a central transversely disposed liquid distributing pan 64 mounted in the upper part of the casing 15, and this pan 64 has an imperforate bottom but communicates at both sides with elongated flat distributing troughs 35 having slots in the bottoms thereof as shown in Figs. 5 and 6. The transverse perforated pan troughs 36, of which there may be any desired number, are disposed directly beneath the longitudinally extending liquid distributing troughs 35; and the hot liquid which is sprayed upon the bottles 29 as they enter and leave the basin 18, eventually collects in this basin and returns to the lower chamber 21 through the openings 24. The pan 64, upper troughs 35 and lower troughs 36 thus cooperate to subject all of the bottles 29 to uniform spray of hot liquid, and also keep the basin 18 constantly filled with the heating liquid. In some cases it may be desirable to provide for additional heating, and another hot water supply trough 64' having heating coils therein as shown in Fig. 3, may then be provided. The trough 64' extends transversely across the casing 15 between the upper and lower troughs 35, 36, and is adapted to deposit hot liquid into the lower troughs 36.

At the discharge end of the main heating zone which has just been described, there is another warm water circulating system which is connected to that at the inlet end. This warm water circulating system comprises the lower chamber 22 having an outlet opening 65 which communicates with the front duct 61 through one passage in the conduit 67; a vertical duct 66 communicating with the chamber 20 through the opening 60 and the other passage in the conduit 67, and having a circulating pump 38 therein; an upper semi-circular transverse distributing trough 35; and a lower perforated pan trough 36 disposed above the chamber 22. The chamber 22 and the adjacent end of the basin 18 may also have heating coils 59' therein for starting purposes, and the perforated pan trough 36 of this system will function to constantly and uniformly spray the bottles 29 leaving the basin 18 with heat absorbing liquid, prior to final cooling and delivery of the treated containers from the machine. The conduit 67 which connects the front and rear chambers 20, 22 and ducts 61, 66, serves to conduct the liquid which is heated by the bottles above the chamber 22, to the supply duct 61 at the front of the machine, and as this liquid is cooled by the entering bottles, it is deposited into the chamber 20 and is returned through the conduit 67 to the duct 66.

At the extreme discharge end of the heat treating chamber 17 there is a cooling system comprising a cool water inlet pipe 68 adapted to deliver liquid into a perforated transverse trough 69 formed to deposit spray over the bottles 29 just prior to delivery thereof from the casing 15; a receptacle 70 located under the conveyor stretch 27 beneath the trough 69, and adapted to receive excess liquid directly from the lower chamber 23; a vertical duct 71 communicating at its lower end directly with the receptacle 70 through a conduit 72 and at its upper end with a transverse semi-circular slotted distributing trough 35, and having a circulating pump 38 therein; and a perforated pan trough 36 disposed beneath the trough 35 and adjacent to the trough 69. This cooling system is obviously adapted to constantly and uniformly spray cooling liquid over the heat treated bottles 29 as they leave the chamber 17, and some of the cooling liquid may be utilized to restore lost liquid to the other systems while the excess may be drained away.

While the normal operation of our improved pasteurizer should be clearly apparent from the foregoing detailed description of the structure, we will give a brief résumé of this operation. The several liquid circulating systems are ordinarily operating to spray liquid downwardly through the heating and cooling zones, and the conveyors 25, 30, 34 are normally operating. The basin 18 is filled with hot liquid delivered thereto from the intermediate spray system, and the pusher bar 28 is being intermittently reciprocated over the bottle supply conveyor 30. As the successive rows of bottles 29 are fed into the path of movement of the pusher 28, this bar pushes the upright bottles onto the plates 31 where they accumulate en masse as shown in Fig. 5, and from whence they are ultimately delivered onto the advancing upper stretch 27 of the main conveyor 25. The conveyor stretch 27 subsequently transports the bottles 29 en masse and in upright position through the heat treating chamber 17 and basin 18, so that the bottles are successively gradually heated by the initial sprays, heated to pasteurizing temperature both by the hot sprays and by the immersion in the basin 18, and finally gradually cooled by the third and fourth ensuing spray systems. The heat treated and cooled bottles 29 are finally removed from the conveyor stretch 27 by the fingers 33 and are ultimately pushed over the plates 32, 55

onto the discharge conveyors 34, 58. It will be apparent that the entire operation is automatically effected, and that all of the product is most effectively and uniformly heat treated by the combined spraying and immersion.

While the partial immersion effected by the apparatus shown in Figs. 1 to 6 inclusive, is ordinarily sufficient to produce efficient treatment, it may be desirable to effect complete immersion in heating liquid either prior or subsequent to spraying. In Figs. 10 to 13 inclusive we have shown diagrammatically, a mechanism for effecting such complete immersion, and this mechanism may be utilized in conjunction with the spray systems previously described. Referring to Figs. 10 to 13 inclusive, the casing 15 is provided with a deep liquid basin 18 beneath the heat treating chamber 17, and the endless bottle conveyor 25 coacts with sprockets 26 and guide pulleys 26' so as to cause the horizontal stretch 27 to travel along the bottom of the basin 18 and to gradually rise from the delivery end of this basin as in Figs. 1 and 4 in order to elevate the bottles en masse and in upright position from the basin 18 after immersion has been effected. The transverse bottle supply conveyor 30 is located over the receiving end of the basin 18, and a pusher bar 28' is mounted for periodic movement transversely across the conveyor 30. A bottle receiving and lowering platform 74 is supported by linkage so that it will periodically move down into the basin 18 in alinement with a fixed bottle receiving plate 75, from a position of horizontal alinement with the upper deck of the conveyor 30, and also so that the platform 74 will always be in a horizontal position. A second pusher bar 76 is adapted to periodically move across the top of the platform 74 whenever the latter is in alinement with the horizontal fixed plate 75, and the motion of the various parts is preferably timed so that there will be no interference.

During normal operation of this modified assemblage, the conveyors 25, 30 are operating, and the basin 18 is substantially filled with heating liquid. The successive filled and sealed bottles 29 are then fed in rows and in upright position, into the path of oscillation or reciprocation of the pusher bar 28', and this bar transfers the successive rows from the conveyor 30 as shown in Fig. 10, to the platform 74 as depicted in Fig. 11. The platform 74 is thereafter automatically lowered as indicated in Fig. 12 to bring the same in horizontal alinement with the fixed plate 75. The mechanism is thereafter moved into the position shown in Fig. 13, to cause the lower pusher bar 76 to slide the successive rows of bottles 29 off the platform 74 and onto the plate 75. The completely immersed bottles 29 are subsequently advanced across the plate 75 and onto the conveyor stretch 27 by the pusher bar 76 coacting with other bottle rows, and after the bottles are thus heated by complete immersion in the heated liquid, they are automatically removed and subsequently further treated by spraying.

From the foregoing detailed description it will be apparent that our present invention provides an improved pasteurizer wherein all of the commodity laden containers are uniformly heat treated by combined immersion or submergence in heating liquid, and spraying with other heating liquid. While it may be preferable in some cases to completely submerge the containers, the partial submergence of the lower portions of the upright containers will most effectively apply the heat to the lower portions of the commodity. The feature of submerging or immersing the containers in addition to utilizing the spraying, will obviously insure most effective and uniform heat treatment of all portions of the commodity. The improved apparatus besides thus effectively heat treating the commodity, is entirely automatic in its operation, and permits pasteurization of large numbers of beverage laden bottles or similar containers, while the latter are disposed in upright position and are being transported en masse through the treating chamber. The mechanism for loading and unloading the bottles is relatively simple and automatic in operation and the loading mechanism may be utilized either to deliver the successive bottles in upright position upon the conveyor stretch 27 above the liquid in the basin 18, or to deposit these bottles directly within the basin 18 in the manner shown in Figs. 10 to 13 inclusive. The improved construction of the liquid distributing and spraying troughs will also insure most effective delivery of the sprays to the bottles, and also provides an ample supply of heated liquid for the basin 18, and by providing the overflow openings 24 at the end of the basin 18, uniform depth of liquid is maintained in this basin. The assemblage shown in Figs. 1 to 9 inclusive is relatively simple and compact in construction and has enormous capacity, and the partial immersion utilized in this assemblage is ordinarily sufficient to insure effective pasteurization.

It should be understood that it is not desired to limit the present invention to the exact details of construction or to the precise mode of operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

We claim:—

1. In combination, a casing having a transverse partition dividing the same into an upper heating chamber and a lower liquid receiving chamber, said partition having gradually and slightly inclined inlet and discharge portions forming a shallow liquid basin at the bottom of said heating chamber and being provided with a transverse overflow passage at one end of said basin communicating directly with said liquid receiving chamber, a conveyor having a succession of receptacle supports movable laterally along said partition and through said basin, spray means in the upper portion of said heating chamber, and means for delivering liquid from said chamber through said spray means upon the receptacles being transported through said basin by said receptacle supports.

2. In combination, a casing having a transverse partition dividing the same into an upper heating chamber and a lower liquid receiving chamber, said partition being transversely horizontal and longitudinally gradually oppositely inclined to provide a shallow liquid basin at the bottom of said heating chamber and being provided at one end of said basin with a transverse overflow passage communicating directly with said liquid receiving chamber, a conveyor having a succession of slightly separated receptacle supports spanning said partition and being movable laterally along the partition and through said basin, spray means in the upper portion of said heating chamber, and means for delivering liquid from said chamber through said spray means upon the receptacles being transported through said basin by said receptacle supports.

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