Nov. 11, 1952 K. W. BOWMAN 2,617,434

BOTTLE-WASHING MACHINE

Filed Sept. 20, 1948 3 Sheets-Sheet 1

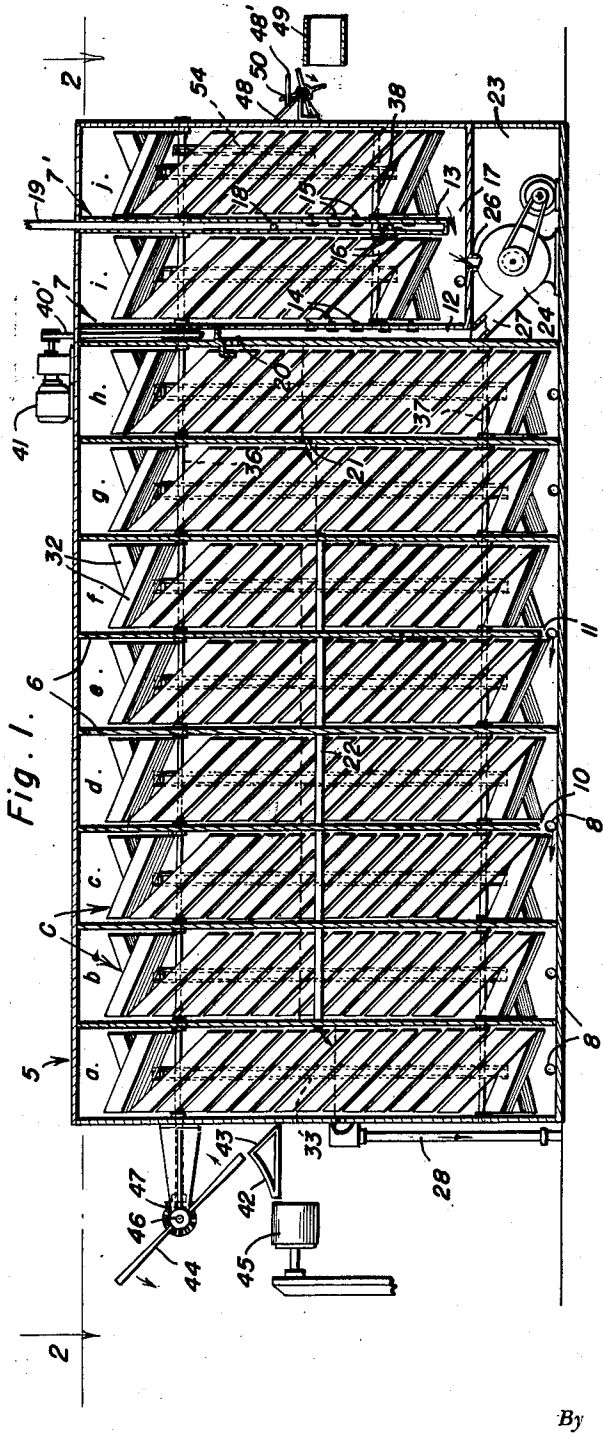


Fig. 1.

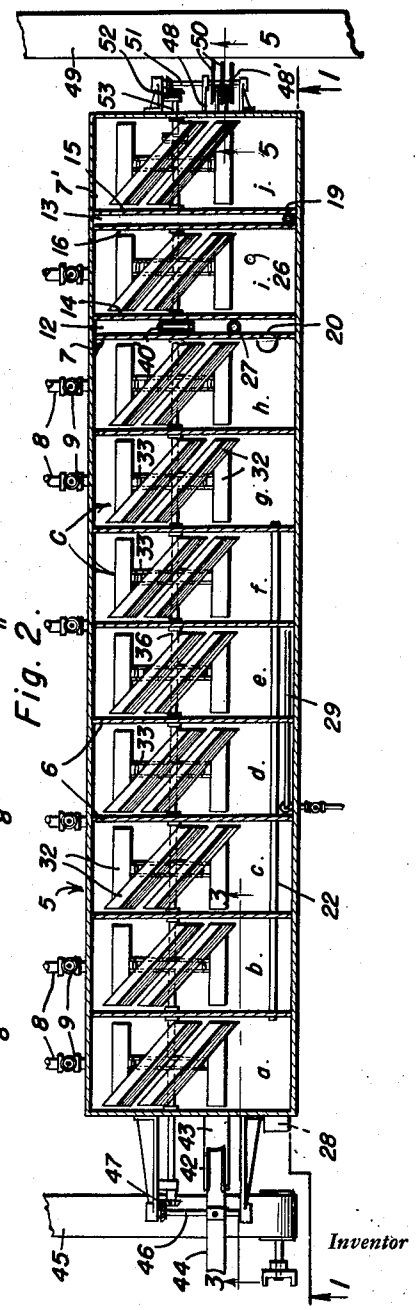


Fig. 2.

Inventor
Kenneth W. Bowman

By Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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BOTTLE-WASHING MACHINE

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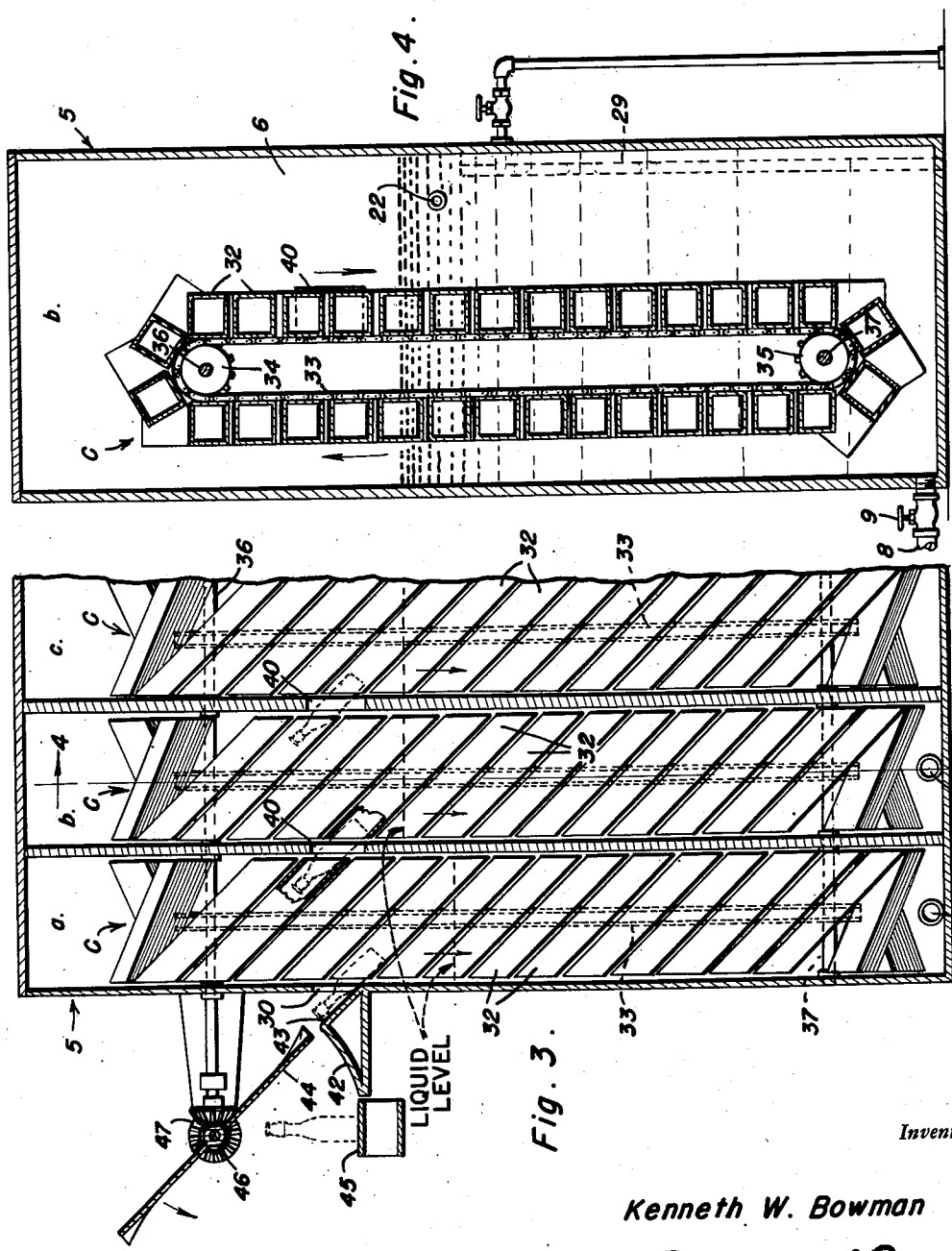


Fig. 3.

Inventor

Kenneth W. Bowman

By Thomas A. O'Brien and Harvey B. Jackson

Attorneys

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BOTTLE-WASHING MACHINE

Filed Sept. 20, 1948 3 Sheets-Sheet 3

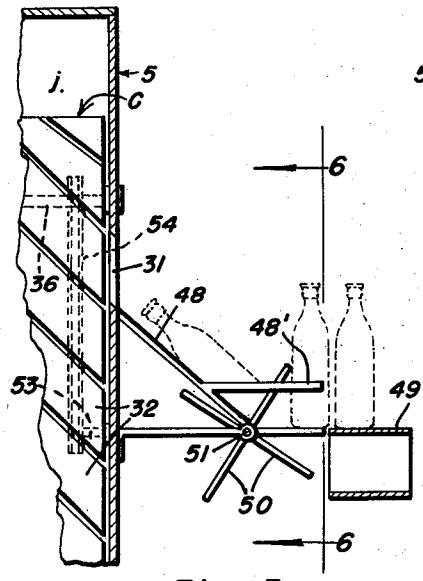


Fig. 5.

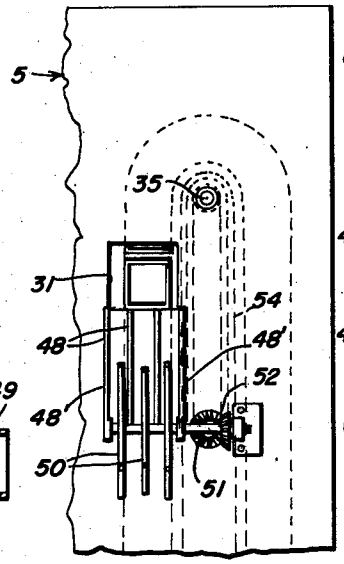


Fig. 6.

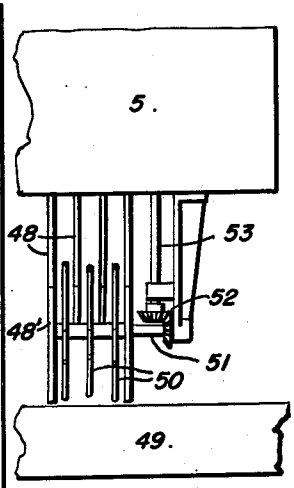


Fig. 7.

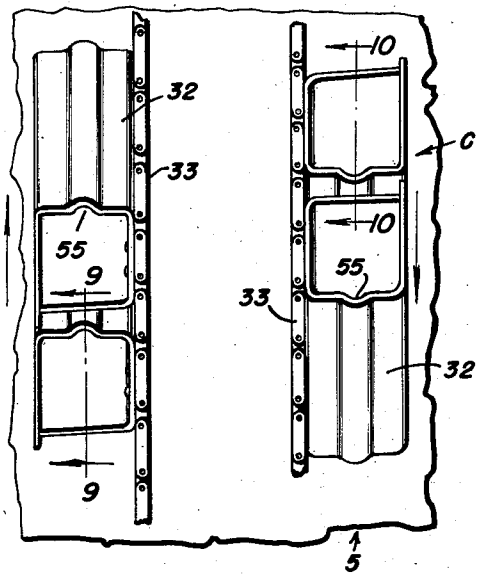


Fig. 8.

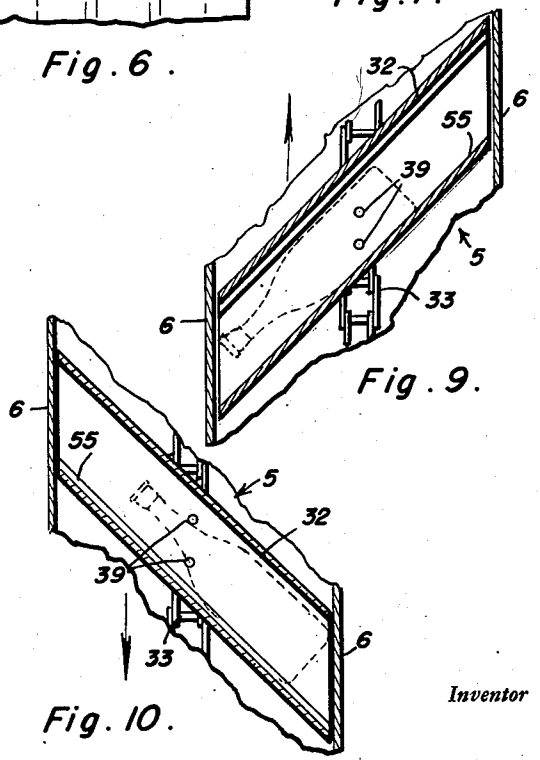


Fig. 10.

Inventor

Kenneth W. Bowman

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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UNITED STATES PATENT OFFICE

2,617,434

BOTTLE-WASHING MACHINE

Kenneth W. Bowman, Terre Haute, Ind.

Application September 20, 1948, Serial No. 50,076

8 Claims. (Cl. 134—60)

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This invention relates to the soaker type of bottle washing machine in which the bottles are passed from one compartment of a tank to another, and in which the bottles are moved in each compartment so as to be filled with liquid therein and then emptied before passing into the next compartment. Heretofore, machines of this type have embodied a single endless carrier arranged to move through all of the compartments and to carry the bottles from each compartment to the next. Such single carrier transfers fluid of one kind from each of certain of said compartments to another compartment containing a fluid of another kind until the fluid in each of certain compartments is polluted or objectionably changed in character by the different fluid from another compartment.

An object of the present invention is to overcome the above objection by providing an upright endless carrier in each tank compartment for moving the bottles therein so as to be alternately filled with the liquid of said compartment and then emptied before being passed to the next compartment, the compartments being defined by transverse partitions, each having an opening or port disposed above the liquid level and through which the bottles may pass from the carrier of each compartment to that of the next compartment. Each carrier moves in a path transversely of the tank and has a series of open-ended tubular cells adapted to receive successive bottles, said cells being inclined longitudinally of the tank so that the bottles successively gravitate through an opening or port from the cells of the carrier in each compartment to those of the carrier in the next compartment.

Another object of the invention is to provide an improved machine of the above kind which is comparatively simple and compact in construction, highly efficient in operation, and otherwise adapted to meet the requirements for successful commercial use.

Other objects and features of the present invention will become apparent from the following description when considered in connection with the accompanying drawings, in which:

Figure 1 is a vertical longitudinal sectional view of a bottle washing machine embodying the present invention, this view being taken upon the plane of the section line 1—1 in Figure 2;

Figure 2 is a horizontal section taken on a line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary vertical longitudinal section taken on a line 3—3 of Figure 2;

Figure 4 is a transverse vertical section taken on a line 4—4 of Figure 3;

Figure 5 is an enlarged fragmentary vertical section taken on a line 5—5 of Figure 2;

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Figure 6 is a fragmentary vertical transverse section taken on a line 6—6 of Figure 5;

Figure 7 is a top plan view of the construction shown in Figure 5;

Figure 8 is a fragmentary side elevation of one of the endless carriers;

Figure 9 is a vertical section through a carrier pocket taken on line 9—9 of Figure 8;

Figure 10 is a vertical section through a carrier pocket taken on line 10—10 of Figure 8.

Referring in detail to the drawings, 5 indicates a horizontally elongated tank which is divided into a plurality of compartments *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, and *j*, by vertical transverse partitions 6, 7, and 7', said compartments having bottom drain pipes 8 provided with shutoff valves 9. As respectively shown at 10 and 11 in Figure 1, the compartments *c* and *d* and the compartments *e* and *f* are placed in communication with each other at the bottom. The partition 7 between compartments *h* and *i* and the partition 7' between compartments *i* and *j* are of hollow or double wall construction to provide spaces 12 and 13 therein, and a wall of partition 7 has nozzles 14 through which jets of liquid may be discharged from the space 12 at an upward angle into compartment *i*. A wall of partition 7' has similar nozzles 15 through which jets of liquid may be discharged at an upward angle from space 13 into compartment *j*, and the other wall of partition of 7' has nozzles 16 through which liquid may be discharged from space 13 into compartment *i* at the side thereof opposite that where nozzles 14 are located. The compartments *i* and *j* also communicate with each other at the bottom as at 17, and arranged in the space 13 is a discharge nozzle 18 connected with the city water supply by pipe 19. A wall of partition 7 has an opening 20 through which liquid may flow from space 12 above nozzles 14 into compartment *h*, and partition 6 between compartments *g* and *h* has an opening 21 through which liquid may overflow from said compartment *h* by said compartment *g*. There is no communication between compartment *g* and compartments *e* and *f*, between compartments *e* and *f* and compartments *c* and *d*, or between compartments *c* and *d* and compartment *b*. A horizontal overflow pipe 22 provides communication between compartment *g* and compartment *a*. It will be noted that the bottoms of compartments *i* and *j* are at an elevation to provide a space 23 therebeneath in which is located a pump 24 driven by a motor 25. The inlet 26 of pump 24 is connected to the bottom of compartment *i*, and the outlet 27 of said pump is connected to the bottom of space 12, so that liquid is pumped from compartment *i* and discharged under pressure into space 12 for being discharged through nozzles 14 and opening 22. An overflow

pipe 28 conducts excess liquid from compartment *a* to a sewer as waste liquid. Means, such as a submerged heating coil 29, is provided to heat the liquid in compartments *d* and *e*. Bottle inlet and discharge openings 30 and 31 are respectively provided in the opposite ends of tank 5.

An upright endless carrier is provided in each tank compartment, each carrier comprising a series of open-ended tubular cells 32 secured to an endless chain 33 passing around sprocket wheels 34 and 35 respectively located near the top and near the bottom of the tank 5 and carried by horizontal shafts 36 and 37 or 38 extending longitudinally of the tank. The carriers move in paths transversely of the tank, and the cells 32 of each carrier are centrally fixed to chain 33 thereof as at 39 so that said cells are disposed obliquely of the chain and are inclined longitudinally of the tank. It will be noted that the cells 32 are of a length to extend substantially entirely across the space between adjacent transverse walls of the tank. Also, an opening 40 is provided in each of the tank partitions through which bottles may pass by gravity from the cells of the carrier in each compartment to those of the carrier in the next compartment. The openings 30, 40 and 31 are arranged so that the cells 32 will register therewith near the top of and at the downwardly moving runs of the carriers, in which runs said cells incline toward the rear end of the machine. Also, the openings, 30 and 40 are disposed in a plane above the level of the liquids in the compartments so that when the higher end of each cell is registered with one of said openings to receive a bottle, the lower end portion of said cell is submerged in and filled by the liquid of the associated compartment to provide a cushion which will prevent the bottle from sliding into the cell with such speed and striking the adjacent partition with such force as would cause breakage of the bottle. It will be noted that the direction of inclination of the cells is reversed as they pass around the lower sprocket wheel 35 and move upwardly. Thus, the bottles may pass bottom foremost or lowermost to cells of each carrier as said cells move downwardly into the liquid of the associated compartment, whereby said bottles become filled with the liquid.

Also, as the bottles are inverted when carried upwardly in each compartment, the liquid in said bottles will be discharged therefrom as they emerge in the ascending run of the carrier from the body of liquid in said compartment. As the bottles are carried over the upper sprocket wheel 34 in each compartment they are again disposed bottom lowermost and moved downwardly for passage by gravity through an opening 40 into the cells of the carrier in the next compartment or through opening 31 from the machine. The nozzles 14 and 15 are arranged to discharge jets of water into the inverted bottles as they are carried upwardly in the compartments *i* and *j*, thereby agitating the water in the bottles for thorough and final rinsing thereof.

In practice, the city water is supplied to the final rinsing compartment *j*, and this fresh water flows and is pumped into rinsing compartment *i*, excess semi-fresh water flowing from compartment *i* to compartment *h* through opening 20, and overflowing from compartment *h* to compartment *g* through opening 21. From compartment *g*, the semi-fresh water overflows through pipe 22 into rinsing compartment *a* and then from the latter through pipe 23 to the sewer. Cleaning solutions are suitably supplied to compartments *c* and *d*, and *e* and *f*, said solutions preferably containing caustic soda. The solution in compartments *e* and *f* is weaker than that in compartments *c* and *d*, and a cleaning and wetting solution is used in compartment *b*. The water in compartment *g* may be made semi-caustic by suitably supplying a small quantity of caustic soda thereto at required intervals. All of the upper sprocket wheels 34 are secured on shaft 36, and the latter is suitably operatively connected as at 40' to a motor 41 to simultaneously drive all of the endless carriers. Coil 29 heats the solutions in compartments *d* and *e*, and the heat thereof is conducted to the solutions in compartments *c* and *f* to temper the same. Pipe 22 is slightly submerged in the solutions of compartments *b* to *f* inclusive so that the semi-caustic solution flowing therethrough from compartment *g* to compartment *a* is also tempered. Until the lower ends of cells 32 register with an opening 40 or the opening 31, the adjacent transverse wall of the tank retains the bottles in said cells.

In operation, the bottles are pre-rinsed in compartment *a*, and then they are successively subjected to the action of the cleaning and wetting solution in compartment *b*, the caustic solutions in compartments *c* and *d* and *e* and *f*, the semi-caustic solution in compartment *g*, and the semi-fresh water in compartment *h*. From compartment *h*, the bottles pass to and are finally rinsed in compartments *i* and *j*, and then they are drained and discharged from the tank through opening 31.

Suitable mechanical feed means is provided to feed the bottles through opening 30 into the cells 32 of the carrier in the first of pre-rinsing compartment *a*. This means may include a ramp 42 leading upwardly and rearwardly to a chute 43 inclined to the bottom of opening 30, and a rotatable paddle-type pusher 44 adapted to move the bottles up the ramp 42 to the chute 43 from a transverse endless conveyor apron 45 on which the bottles are placed in single file by an attendant. The pusher 44 is secured on a transverse shaft 46 geared at 47 to the forward end of driven shaft 36.

Suitable mechanical transfer means is also provided to receive the washed bottles as they are discharged at an inclination through opening 31 onto inclined chute bars 48, and to move them between guides 48' to an upright position onto a transverse endless conveyor apron 49 by which the bottles are delivered to a desired destination. This means includes a rotatable transfer element having transverse rows of radial fingers 50 arranged to pass between the chute bars 48 and to engage behind the bottles, said transfer element being secured on a transverse shaft 51 geared at 52 to a longitudinal counter shaft 53 which is suitably driven as at 54 by shaft 36. Each cell 32 may have a central internal longitudinal groove 55 in the wall thereof which is at the bottom of the cell when the latter moves downwardly, whereby to center the bottle in the cell.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily understood and appreciated by those skilled in the art. Modifications and changes in details of construction are contemplated such as fairly fall within the spirit and scope of the invention as claimed.

What I claim here is:

1. In a bottle washing machine, the combination of a tank divided by transverse vertical par-

titions into a plurality of liquid-containing compartments, and an upright endless carrier in each compartment movable in a path transversely of the tank and through the liquid therein, each carrier including a pair of spaced sprockets spaced respectively above and below the level of the liquid in the compartments and an endless chain entrained thereover having a series of open-ended tubular bottle receiving cells secured thereto obliquely thereof for being disposed at a rearward inclination in the downwardly moving run of the carrier and at a forward inclination in the upwardly moving run thereof, the rear wall and partitions of the tank having openings disposed in a plane above the level of the liquid in the compartments and so as to register with the lower ends of the cells in the downwardly moving runs of the carriers, whereby the bottles may gravitate from the cells in the carrier in each compartment into those of the carrier in the next compartment and from the carrier in the last compartment out of the rear end of the tank, the front wall of the tank having a similar opening arranged to register with the higher ends of the cells in the downwardly moving run of the carrier in the first compartment, so that bottles may be fed therethrough into the machine.

2. The construction defined in claim 1, wherein the first compartment is provided with an overflow opening below the opening in the front wall of the tank arranged so that when the higher end of each cell of the carrier in the first compartment is registered with the opening in the front wall, the lower end portion of said cell is below the overflow opening to be submerged in and filled by liquid of said compartment to provide a cushion for a bottle fed into the cell.

3. The construction defined in claim 1 wherein the tank is divided into a first pre-rinse compartment, washing compartments, two communicating final rinse compartments and two compartments communicated by overflow and to one of which water overflows from one of said final rinse compartments, means to heat the liquid in certain of the washing compartments, and a horizontal overflow pipe for conducting water from one of said compartments which communicate by overflow to the pre-rinse compartment, said overflow pipe being arranged to be slightly submerged in the liquids of the washing compartments.

4. The construction defined in claim 1, wherein the tank is divided into a pre-rinse compartment, washing compartments, and first and second final rinse compartments, the partitions defining the final rinse compartments being of hollow double wall construction to define spaces therein, a motor driven pump having an inlet communicating with the bottom of the first final rinse compartment and an outlet communicating with the space in the partition defining said first final rinse compartment, certain walls of the hollow partitions having nozzles for directing upwardly inclined jets of water into bottles contained in the cells of the upwardly moving runs of the carriers in said final rinse compartments, and means to supply water under pressure to the space in the partition defining the second final rinse compartment.

5. The construction defined in claim 1, in combination with means for driving said carriers including a driven shaft common to all of said carriers, a transverse endless conveyor in front of the tank, means operatively connected to said driven shaft for feeding bottles from said conveyor to the carrier in the first compartment, a second transverse endless conveyor at the back of said tank, and means operatively connected to said driven shaft for transferring bottles to the second named conveyor as they are discharged from the carrier in the last compartment.

6. In a bottle washing machine, the combination of a tank divided by transverse vertical partitions into a plurality of liquid containing compartments, an upright endless carrier in each compartment movable in a path transversely of the tank, each carrier including a pair of spaced sprockets disposed respectively above and below the level of the liquid in the compartments and an endless chain entrained thereover having a series of open-ended tubular bottle receiving cells secured thereto transversely and obliquely thereof for being disposed at a rearward inclination in the downwardly moving run of the carrier and in a forward inclination in the upwardly moving run thereof whereby the bottles are filled with liquid and then inverted to discharge the liquid therefrom, the end walls and partitions of the tank having openings above the level of liquid in the compartments, whereby bottles may pass by gravity into the cells of the carrier in the first compartment, from the cells of the carrier in the last compartment, and from the cells of the carrier in each compartment to those of the carrier in the next compartment, and means for driving said carriers.

7. In a bottle washing machine, a tank having a partition therein dividing the same into first and second compartments, a pair of vertically spaced horizontal shafts journalled through the compartments, said shafts being disposed respectively above and below the liquid level in the compartments, sprockets fixed on each of the shafts in each of the compartments, an endless chain entrained over the sprockets in each of the compartments, open-ended tubular bottle receiving cells secured to each of the chains obliquely thereof for being disposed at a vertical inclination in one direction on the downwardly moving run of the chain, said partition having an opening therethrough registering with the lower end of a cell in the first tank and the upper end of a cell in the second tank with the opening being disposed in a horizontal plane between the sprockets, so that the cells are moving in a straight path during registry with the opening, and means for placing bottles in the cells in the first compartment and for removing bottles from the cells in the second compartment.

8. The combination of claim 7, wherein the second compartment is provided with an overflow below the opening in the partition and arranged so that a cell having its upper end in registry with the opening in the partition will have its lower end below the overflow so that a liquid in the second compartment will cushion movement into such cell of a bottle.

KENNETH W. BOWMAN.

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