

March 5, 1963

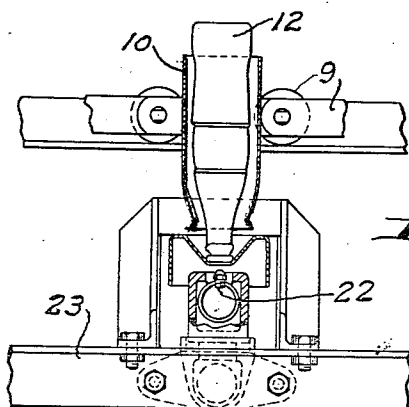
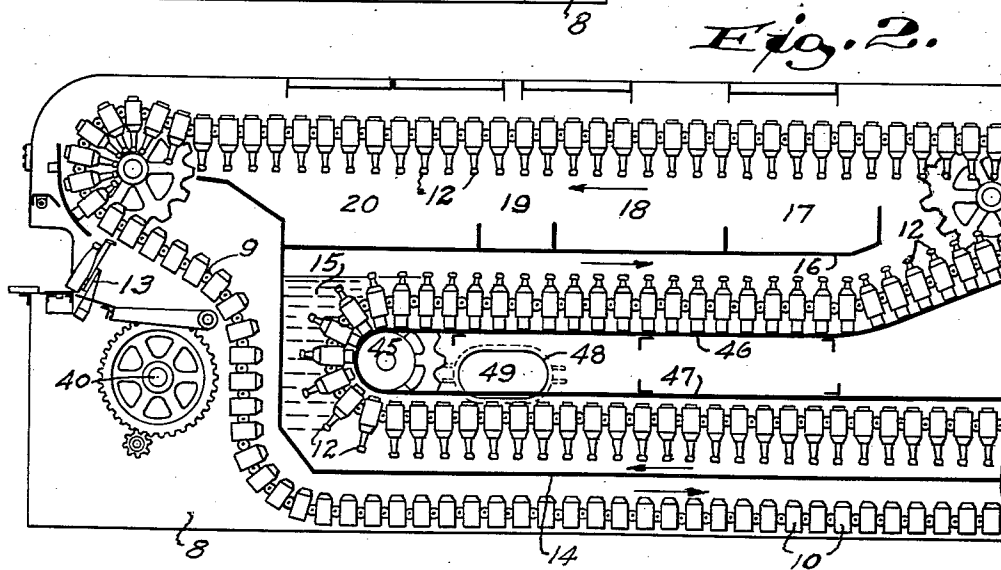
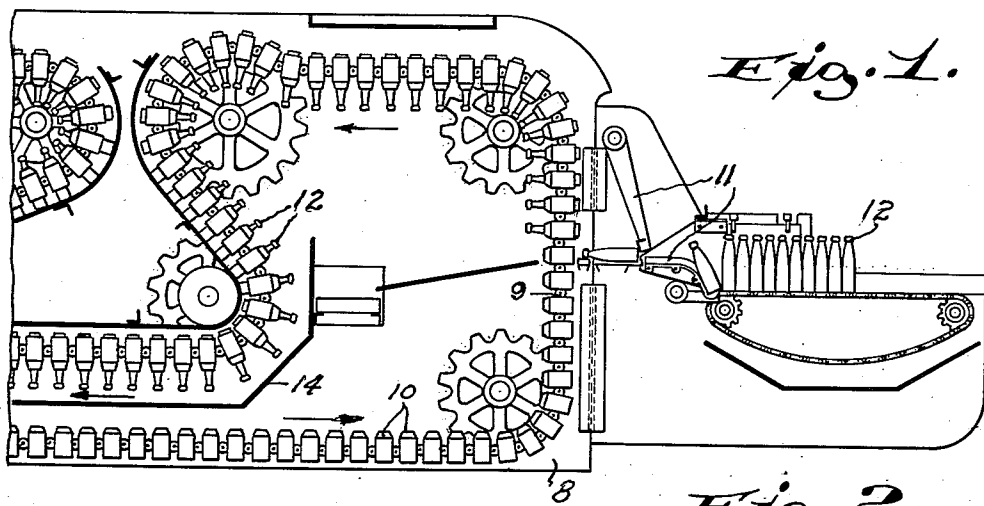
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3,079,936

BOTTLE WASHING EQUIPMENT

Filed July 3, 1961

2 Sheets-Sheet 1



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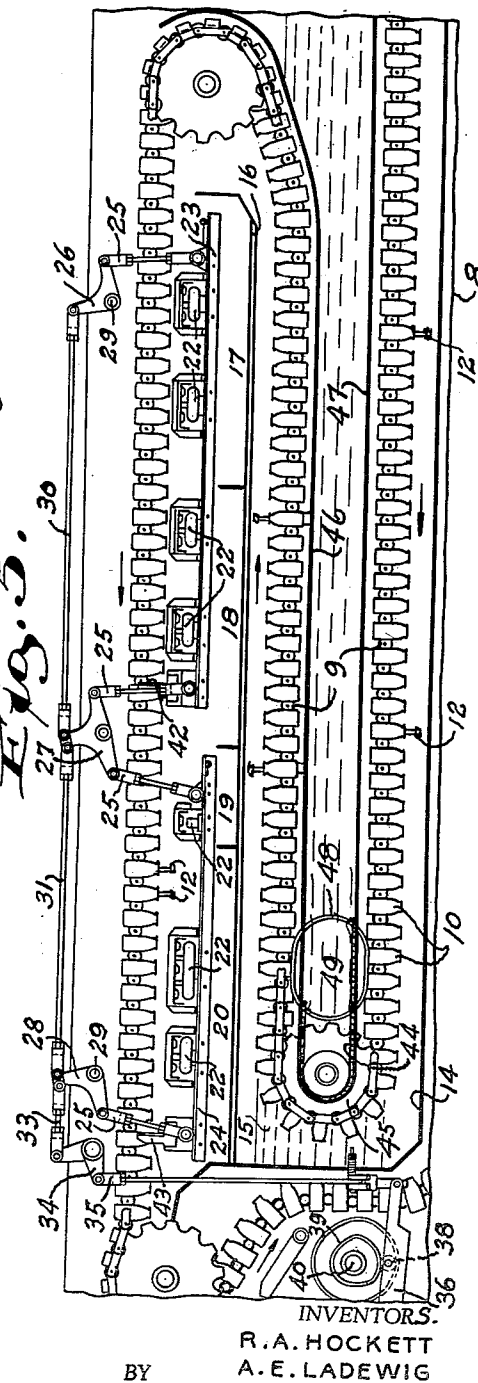
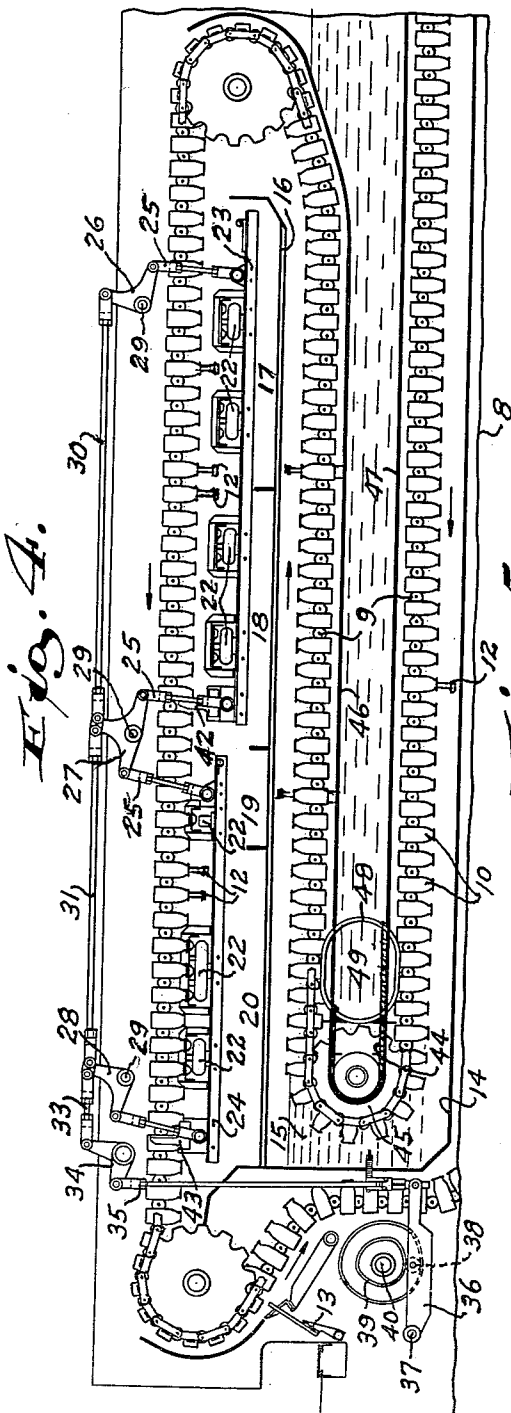
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BOTTLE WASHING EQUIPMENT

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5 Claims. (Cl. 134-73)

The present invention relates generally to improvements in the art of cleansing commodity receptacles such as bottles, and it relates more specifically to improvements in the construction and operation of automatic bottle washing machines.

The primary object of this invention is to provide improvements in equipment for cleansing receptacles such as bottles or the like, whereby the construction thereof is simplified and its effectiveness is enhanced.

It has heretofore been customary as shown and described in Patent No. 2,774,361, dated December 18, 1956, to automatically cleanse successive bottles of various kinds, by transporting an endless series of transverse rows of the dirty bottles while immersed through a soaking liquid basin, and by thereafter removing the bottles from the soaking liquid and conveying them past several sets of spray nozzles mounted upon a common upwardly and downwardly movable support disposed above the soaking basin. When the bottles are being thus transported through the machine, they are confined within pockets carried by a longitudinally advancing endless conveyor, and after passing through hot chemical in the soaking basin the bottles are successively showered with chemical solution, chemical rinse liquid, semi-fresh washing liquid, and with final rinse water delivered from the successive spray nozzle sets.

While this general type of bottle washer has proven quite satisfactory and commercially successful, some difficulties have been encountered especially in machines of large capacity. Because all of the spray nozzles were heretofore raised and lowered simultaneously and it required a sturdy and rather heavy common support for the several nozzle sets, it was necessary to provide relatively strong and complicated springs in order to counterbalance the weight of such a reciprocating support. These springs coated with bell cranks and linkage associated with the nozzle support and subject the bell crank pivots to considerable pressure and consequent rapid wear, and some of the springs also became weakened due to repeated compression and expansion and thereafter did not function properly.

Then, too, in such bottle soaking and washing machines embodying the chemical solution basins, debris such as broken bottles and labels frequently collects upon the elongated retainer strips coacting with the bottles to hold them in the pockets, and this accumulated debris collects near the chain conveyor and guiding wheels at the bottle delivery end of the basin and interferes with proper advancement of this conveyor.

It is therefore an important more specific object of the present invention to provide improved means for effectively counterbalancing the weight of the liquid injection nozzle devices of such bottle washers without the aid of springs or other such counterbalancing means, by dividing the movable nozzle devices into several sections each carrying some of the nozzles and by causing the weights of these nozzle laden sections to substantially balance each other.

A further important object of the invention is to provide improved bottle washer drive mechanism including a special rotary cam for simultaneously raising one set of cleansing spray nozzles and lowering another set with respect to successive transverse rows of bottles being trans-

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ported by an advancing conveyor past the nozzles, and vice versa, whereby smooth and quiet functioning of the machine results and the wear on parts is minimized.

Another important object of the present invention is to provide an improved washer having the spray nozzles divided into reversely vertically reciprocable sections, and wherein the several nozzle sections are provided with dogs cooperable with the bottle conveyor so that this conveyor aids in moving the sections in the direction of advancement of the bottles and in unison therewith.

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

A clear conception of the features constituting the present improvement and of the construction and operation of a bottle washer embodying the invention 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 diagrammatic central, longitudinal vertical section through the front half of a typical bottle washing machine, showing the manner in which the dirty bottles are loaded into the carrier pockets and transported by the endless conveyor into the soaking tank;

FIG. 2 is a similar diagrammatic section through the rear half of the same machine, showing the manner in which the endless conveyor transports the bottles through the soaking tank and the final spray washing and rinsing zones and delivers the clean bottles from the washer, the spray rinsing devices, however, having been omitted;

FIG. 3 is an enlarged, central, vertical section through one of the spray washing units showing the same mounted upon its support and cooperating with a bottle disposed within one of the carrier pockets associated with a fragment of the endless conveyor;

FIG. 4 is another central, longitudinal, vertical section through a similar bottle washing machine showing the major portion of the soaking tank and of the casing diagrammatically and in section, but the spray washing and rinsing mechanism in elevation, the initial portion of the two-part spraying devices being shown lowered and inactive and the final portion being shown elevated and active, while most of the bottles have been omitted for the sake of clarity; and

FIG. 5 is a combined section and elevation similar to that of FIG. 4 but showing the initial spray washing portion elevated and active, and the final spray washing portion lowered and inactive.

While the invention has been shown and described herein as being advantageously applicable to a bottle washer wherein the dirty bottles are loaded into the machine at one end and the clean bottles are discharged at the opposite end and in which the bottles are being advanced continuously, it is not intended to confine the use of the improved features to such machines; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawings, the bottle washing machine shown therein comprises, in general, a casing or housing 8 having therein an endless conveyor 9 provided with successive transverse rows of bottle carrier pockets 10; bottle loading mechanism 11 at one end of the housing 8 for introducing bottles 12 into the pockets 10 at one end of the machine; bottle ejecting mechanism 13 for ejecting the bottles 12 from the opposite end of the machine; a bottle soaking tank 14 confined within a lower portion of the housing 8 and in which the conveyor 9 is adapted to initially transport the dirty bottles 12 successively in inverted position and thereafter in upright position through hot caustic solution 15; a partition 16 substantially spanning the tank 14 and dividing the interior of

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the housing into a series of spaced spraying zones 17, 18, 19, 20; and mechanism for propelling the conveyor 9 in the direction indicated by the arrows.

All of the elements of the machine thus far described are old and well known, but in prior bottle washers of this type, the spray washing and rinsing nozzles which were movably supported within the spraying zones were mounted upon a common support and were simultaneously movable up and down while the weight of the nozzles and their supports was counterbalanced by means of heavy springs which besides subjecting various bearings to heavy pressure and rapid wear were also subject to breakage or weakening and thus failed to function properly.

In accordance with the present invention, the spray nozzles 22 such as shown in detail in FIG. 3 are divided into two separate groups, one of which is carried by an elongated support 23 located in the zones 17, 18, and the other of which is carried by an independent elongated support 24 located in the zones 19, 20 as shown in FIGS. 4 and 5. These horizontal supports 23, 24 are suspended by rods 25 from three bell cranks 26, 27, 28 all swingably mounted upon transverse pivots 29 carried by the housing 8, and the medial bell crank 27 has three radial arms, two of which are connected to the adjacent ends of both nozzle supports 23, 24 while the end bell cranks 26, 28 each have two radial arms, one of which is connected to the opposite end of the corresponding nozzle support. The upstanding remaining arms of the bell cranks 26, 27, 28 are interconnected by links 30, 31, and the weights of the two spray devices including their supports 23, 24 and all of the nozzles 22 mounted on each support should be substantially equal.

In order to impart alternate parallel up and down reciprocating movement to the supports 23, 24 through the rods 25, bell cranks 26, 27, 28, and links 30, 31, the upstanding arm of the end bell crank 28 is connected by means of a link 33, another crank 34, and a rod 35 with the swinging end of a lever 36 the opposite end of which is pivotally suspended from the housing 8 by a pin 37, while its medial portion carries a roller 38 coacting with a revolving cam 39 secured to a shaft 40, as shown in FIGS. 4 and 5. With this arrangement and with the cam 39 properly constructed and timed, one spray nozzle support 24 will be elevated into active position to deliver liquid sprays against the bottles 12 being transported by the conveyor 9 through the zones 19, 20, while the other support 23 will be lowered into inactive position as in FIG. 4, and vice versa as in FIG. 5, and since the weights of the two spray assemblages are substantially equal, they will counterbalance each other during such vertical reciprocation of these assemblages.

During periods of activity of the spray nozzles 22, these nozzles must advance with the conveyor 9 so as to most effectively deliver the spray liquid against the adjacent inverted bottles 12 passing through the zones 17, 18, 19, 20, and in order to insure such simultaneous advancement, the nozzle supports 23, 24 are provided with upwardly projecting dogs 42, 43, respectively, which are adapted to engage the adjacent conveyor rollers or link connecting pins as shown in FIGS. 4 and 5, whenever the supports 23, 24 are elevated into active position. The advancing conveyor 9 thus insures proper delivery of the spray liquid against the adjacent bottles, while the bell cranks are counterbalancing the weight of the nozzle assemblages, and the nozzles 22 must be supplied with spray liquid whenever they are elevated into active position but the spray liquid supply may or may not be shut off when the nozzles are lowered into inactive position, in a well-known manner.

The conveyor 9 coacts with a series of guide wheels, one of which may be a sprocket positively rotated by an electric motor, while the others are idlers coacting with the endless chain to properly advance the bottle carrier pockets 10 through the hot caustic solution 15 in the soak-

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ing basin 14 and through the spray zones 17, 18, 19, 20 in succession. In the embodiment of the invention shown in the drawing, the nozzles 22 in the initial spray zone 17 may deliver washing solution at relatively high pressure and temperature against the inverted bottles 12 passing therethrough while the sets of nozzles 22 in the second spray zones 18 carried by the same support 23 are delivering tempering solution against other bottles 12 advancing through this zone 18. The nozzles 22 in the third spray zone 19 are adapted to deliver rinsing water at reduced temperature against the inverted bottles 12 while passing through this zone, while the sets of nozzles 22 in the final spray zone 20 carried by the same support 24 are delivering fresh and cooler cleansing water against the bottles advancing therethrough. This arrangement of spray washing nozzles 22 may be varied to suit, but it is important to have the two nozzle supports 23, 24 substantially equally loaded.

While the bottles 12 are being initially submerged and advanced through the hot caustic solution 15 in the soaking basin, considerable debris such as broken bottles, dirt, and labels will be removed from the bottles. The endless conveyor 9 while passing through the solution 15 has its direction of travel reversed by one or more idler wheels 45 which are immersed in the solution and is also guided by fixed strips or plates 46, 47 which retain the bottles 12 within the pockets 10 while being subjected to the soaking action. Since the lowermost stretch of the conveyor 9 travels toward the wheels 45, considerable debris is carried toward and accumulates on these guide wheels and must be periodically removed so as to insure proper operation of the machine. In order to permit such periodic removal of debris, the housing 8 is provided with a relatively large side opening 48 normally sealed by a removable cover 49 and with a C-shaped debris collecting plate 44 spanning the tank 14 and the upper leg of which stops at the opening 48 while the lower leg reaches across this opening, as shown in the drawings, and this plate provides a pocket which effectively collects the debris and has proven highly advantageous in maintaining the machine in proper operating condition.

The normal operation of the improved bottle washer should be clearly apparent from the foregoing detailed description of the construction and functioning of the various parts, and when the machine is operating the bottle carrier pockets 10 are preferably maintained substantially filled with bottles 12 as the conveyor 9 proceeds from the loading mechanism 11 to the discharge mechanism 13 and the bottles are subjected to the successive cleansing actions. During such normal operation the two spray nozzle supports 23, 24 will be alternately raised and lowered by the bell cranks 26, 27, 28 and the links 25 and connecting rods 30, 31, and since the weight of the two loaded supports 23, 24 is substantially equal the pivot pins 29 will be subjected to minimum pressure and wear. The dogs 42, 43 insure proper cooperation of the nozzles 22 with the adjacent bottles 12; and the debris collecting pocket formed by the C-shaped plate 44 cooperates with the opening 48 and doors 49 to assist in maintaining the washer in effective operating condition. The invention has gone into highly satisfactory and successful commercial use especially in connection with machines having enormous capacity.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. A bottle washer comprising, a housing, a conveyor for transporting bottles in succession through said housing, two sets of bottle cleansing nozzles movable toward and away from the path of travel of the adjacent bottles being transported through said housing by said conveyor, an independent support for thus moving the nozzles of each of said sets, and means connecting said supports to effect-

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simultaneous movement thereof in opposite directions toward and away from said path the weight of the nozzles and the support of one set thereof substantially counterbalancing the weight of the corresponding elements of the other set.

2. A bottle washer comprising, a housing, a conveyor for transporting transverse rows of bottles in succession horizontally through said housing, two sets of bottle cleansing nozzles supported for movement toward and away from the path of travel of the adjacent bottles being transported through said housing by said conveyor, and means connecting said sets for moving said nozzles of one set toward its adjacent bottles while simultaneously moving the nozzles of the other set away from its adjacent bottles, the weight of said nozzles and the supporting means of one set substantially counterbalancing the corresponding weight of said elements of the other set.

3. A bottle washer comprising, a housing, a conveyor for transporting transverse rows of bottles in succession along a substantially horizontal path through said housing, separate sets of cleansing devices disposed and movable within said housing toward and away from said path, the weight of said devices in one of said sets being substantially equal to that of the devices in another of the sets, and mechanism including a single rotary cam operable to simultaneously move one of said devices toward its adjacent bottles while moving the devices in the other set away from its adjacent bottles and vice-versa.

4. A bottle washer comprising, a housing, a conveyor for transporting bottles in succession through said housing, two sets of cleansing nozzles in said housing alternately movable toward and away from the adjacent bottles being transported by said conveyor, an independent support for thus moving each nozzle set, and a dog carried by each of said supports and being cooperable with said conveyor to align the nozzles with the adjacent ad-

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vancing bottles, said supports of the several sets being connected for simultaneous movement in opposite directions with the weight of the nozzles and the support of one set substantially counterbalancing the weight of the corresponding elements in the other set.

5. A bottle washer comprising, a housing, a conveyor for transporting transverse rows of bottles in succession along an approximately horizontal path within said housing, at least two transverse rows of cleansing nozzles movable toward and away from the path of travel of the adjacent bottles being transported through said housing by said conveyor, linkage for simultaneously moving said nozzles in one row toward the adjacent bottle path while moving the nozzles in another row away from said path, and a dog movable with the nozzles in each row and being cooperable with said conveyor to align the nozzles with the adjacent advancing bottles, the weight of said nozzles in one row substantially counterbalancing the corresponding weight of the nozzles in the other row.

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