June 3, 1930. F. B. REILY 1,761,492

BOTTLE WASHING MACHINE

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FIG. 5

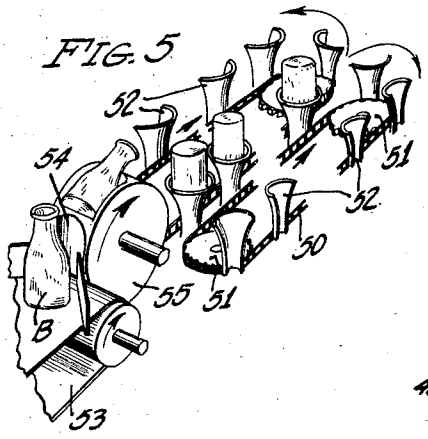


FIG. 1

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FIG. 2

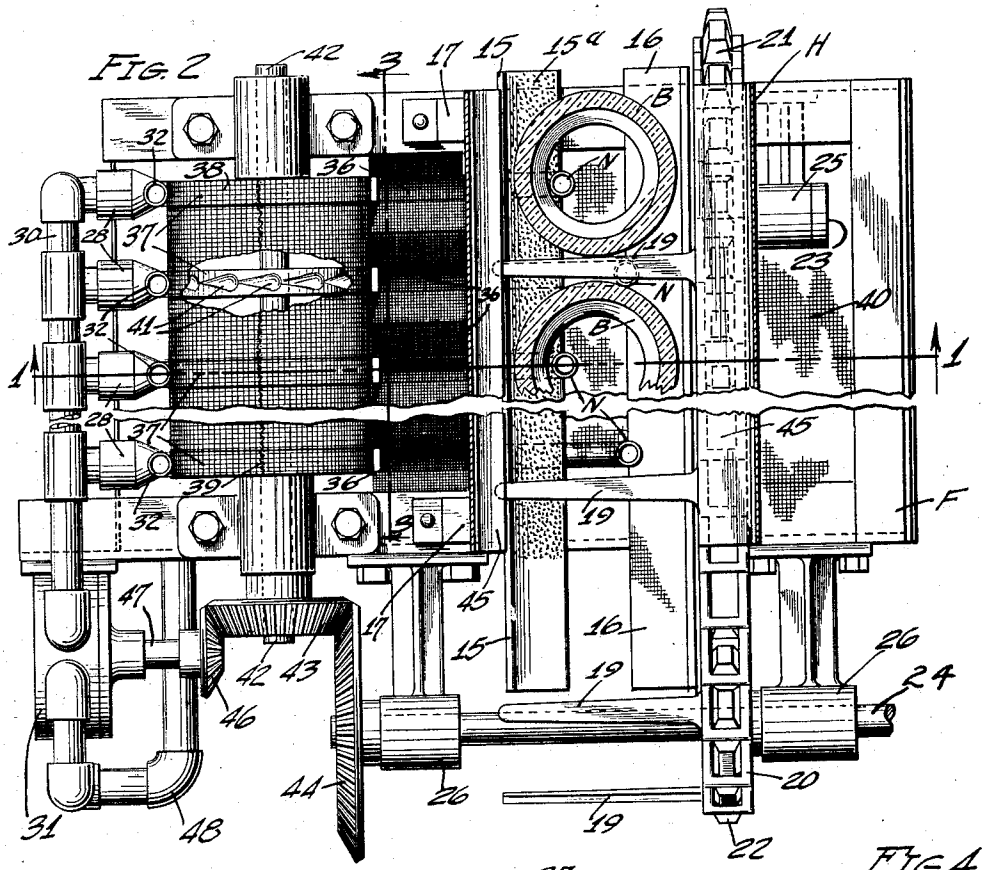
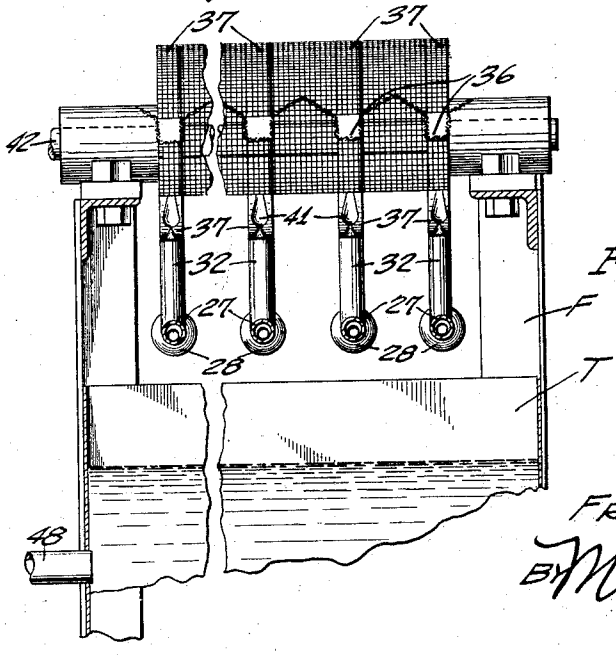


FIG. 4



FIG. 3



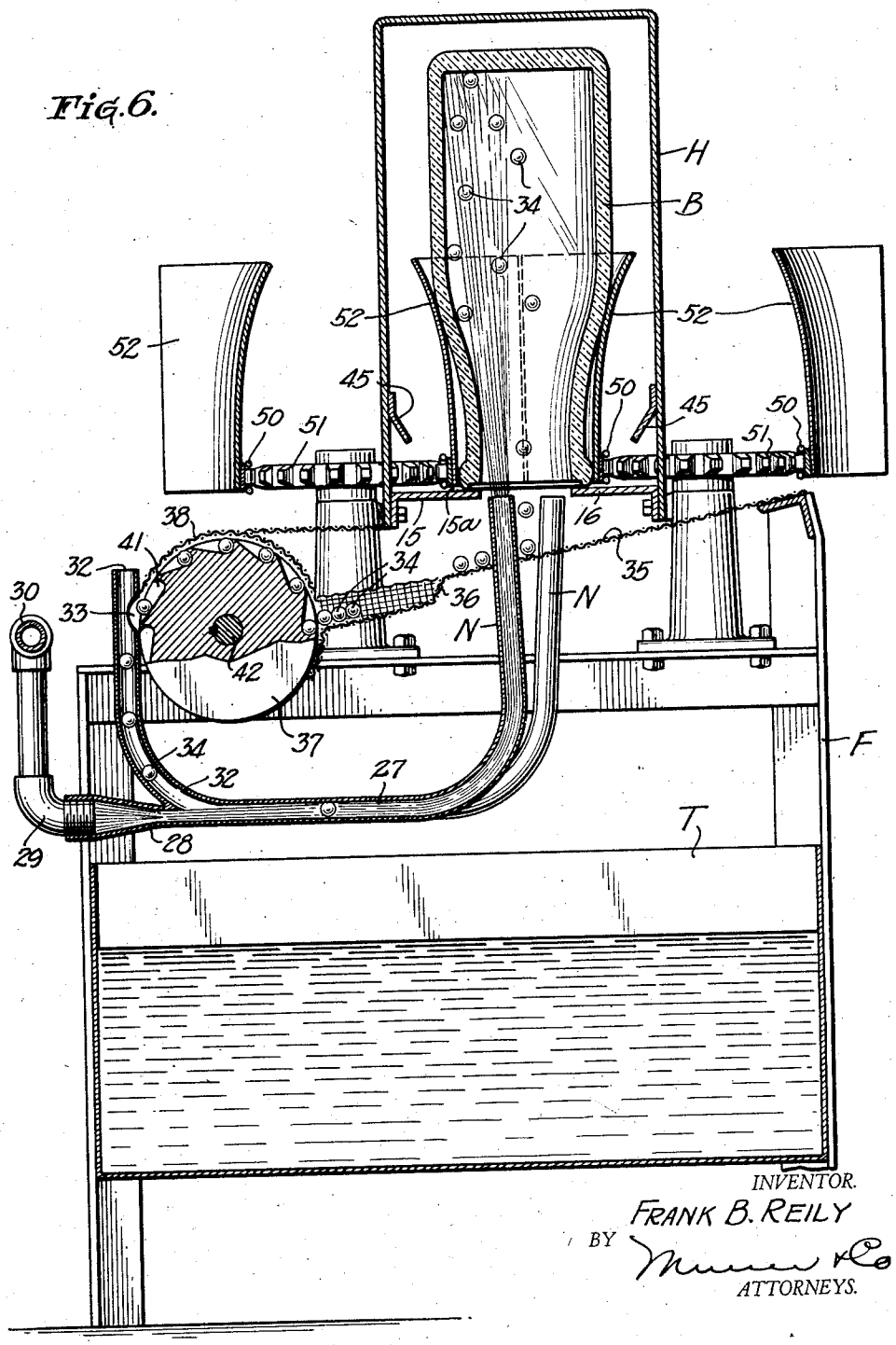
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Fig. 6.



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UNITED STATES PATENT OFFICE

FRANK B. REILY, OF SANTA BARBARA, CALIFORNIA

BOTTLE-WASHING MACHINE

Application filed March 6, 1928. Serial No. 259,558.

My invention relates to machines for washing bottles, and a purpose of my invention is the provision of a bottle washing machine which will remove all of the dirt and foreign matter from both the interiors and exteriors of the bottles to a superior degree than is possible in similar machines heretofore proposed.

My invention has reference particularly to bottle washing machines in which the bottles are inverted, successively fed over and scoured by jets of fluid containing solid objects such as rubber spheres which, under the force of the fluid, are projected into the bottles, and by reason of their physical contact with the surface of the bottles both in entering and leaving the bottles aid in removing grease, dirt, and other foreign matter from the bottles.

One characteristic of my invention resides in the provision in a machine of the foregoing type of objects for use in connection with the washing fluid which are of a substance that yields to the force of impact and thus flattens out against the surface of the bottles and which, coupled with its rotating motion, produces a superior scouring action and thus removes foreign matter more effectively. The substance of which the objects are formed is preferably, although not necessarily, rubber, in order that after the force of impact has been spent they will return to spherical form.

It is also a purpose of my invention to provide in bottle washing machines of the class described, a platform which, under the forward feeding movement of the bottles causes them to be rotated and to thereby present all surfaces to the scouring jets and thus effect a more thorough cleaning of the bottles.

I will describe only one form of bottle washing machine embodying my invention and will then point out the novel features in claims.

Fig. 1 is a vertical sectional view taken on the line 1—1 of Fig. 2 illustrating one form of bottle washing machine embodying my invention;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged detail view of one of the scouring objects employed in the machine as illustrated in Fig. 1; and

Fig. 5 is a fragmentary perspective view showing another means embodying my invention which may be employed in place of the means shown in Figs. 1 and 2 for conveying bottles through the washing machine.

Fig. 6 is a view similar to Fig. 1 illustrating the complete bottle washing machine with the form of bottle conveying means illustrated in Fig. 5 incorporated therein.

In carrying out my invention, I provide a frame F in which is supported a tank T constituting a reservoir for the fluid to be used in washing the bottles. Above the tank are a pair of angle bars 15 and 16 secured in spaced parallel relation on beams 17 and 18, respectively, the latter in turn being secured on the frame F. These bars 15 and 16 constitute a platform on which bottles B in inverted position are adapted to be supported and moved by a conveying mechanism which, in the present instance, comprises arms 19 secured at intervals to an endless chain 20 and extending laterally therefrom so as to be disposed transversely of the platform and to engage the bottles adjacent their lower ends for advancing the bottles along the platform. The chain 20 is trained about sprocket wheels 21 and 22 fixed to shafts 23 and 24, respectively, journaled in suitable bearings 25 and 26, the shaft 24 adapted for connection to a suitable source of power designed to operate all moving parts of the machine, and to operate the conveying mechanism so that the arms 19 will function to slowly advance the bottles in a single-file order from the entrance to the discharge end of the platform.

The bottom surface of the angle bar 15 is roughened or otherwise treated, as indicated at 15^a (Fig. 2), for the purpose of producing rotative movement of the bottles as they are advanced along the platform. With the surface 15^a of the bar 15 roughened

and the corresponding surface of the bar 16 smooth, it will be clear that the uneven friction presented to the bottle ends as they are advanced by the arms 19 will cause the bottles to be rotated about their own axes so as to present all surfaces to the cleaning action of the fluid jets and scouring objects.

The spacing of the platform bars 15 and 16 provides a slot centrally along the length of the platform to permit jets of washing fluid from nozzles N to project upwardly through the necks of the bottles, and these nozzles extend downwardly from the platform as shown in Fig. 1, where they communicate with horizontal tubes 27 each of which latter is connected to the conical and restricted spout 28 threaded interiorly for connection to a pipe 29 branching from a main pipe 30 connected to a water pump 31. At the point of connection between the tube 27 and the spout 28 is an upwardly extending tube 32 having an opening 33 adjacent its upper end through which scouring objects 34 are deposited into the tube so as to gravitate downwardly into the tube 27. The upper end of the tube 32 is open to allow the free entrance of air and to also permit the insertion of additional scouring objects when necessary. The tube 32 is curved at its lower end to merge into the tube 27 and at a point just in advance of the restricted portion of the spout 28. With water supplied to the spout 28 from the pump 31, the constricted portion of the spout functions to restrict the flow of water and produce a water jet which, as it is discharged into the tube 27, produces an injector action in the tube 32 thereby drawing the objects 34 downwardly and into the jet. As a consequence, the objects are projected through the tube 27 and upwardly of the spout end to be discharged upwardly with the jet of water as emanating from the nozzle.

With a bottle B positioned over any one nozzle N the objects 34, as projected from the nozzle, will be discharged into the bottle. Each scouring object 34 is constructed of relatively soft rubber or any other substance which will permit the object to flatten out under the force of impact produced at the instant of striking the wall of the bottle in order to produce a superior scouring action as will be understood. The scouring objects may be formed of sponge rubber, or any other resilient material which has a roughened surface so as to increase the cleaning action of the objects when in contact with the wall of the bottle. By employing scouring objects of this character it will be manifest that the temporary distortion of the objects when striking the wall of the bottle, coupled with their rotative movements, which is bound to occur both during the upward and down movement of the objects, produces a thorough scouring action which, in conjunction with the jets of fluid, effects the removal of all foreign matter from the inner surface of the bottle.

The scouring objects 34 may be used repeatedly in the cleaning of a plurality of bottles by the provision of suitable means for returning the objects to the tubes 32 after they are discharged from the bottles. This means, in the present instance, comprises inclined screens 35 connected at their lower ends to screen troughs 36, the latter being of synclinal form in cross-section and each inclined downwardly toward the periphery of a wheel 37. The top portion of each wheel is covered by an arcuate screen 38, and from this screen is extended a horizontal screen 39 terminating at the angle bar 15. Another screen 40 extends from the opposite side of the frame F to the angle bar 16 and these screens 39 and 40 prevent accidental discharge of the scouring objects from the machine. The objects 34, after leaving any one bottle B, are discharged onto the corresponding inclined screen 35 and from the latter into the corresponding trough 36, whence they gravitate into pockets 41 formed in the periphery of the corresponding wheel 37. All of the wheels 37 are fixed to a shaft 42 driven from the shaft 24 by the provision of mitre gears 43 and 44 (Fig. 2). The construction of the pockets 41 and the direction of rotation of the wheels 37 are such that the objects 34 are elevated on the peripheries of the wheels and finally discharged through the openings 33 into the tubes 32, the upper portion of the tubes being in tangential relation to the peripheries of the wheels, as clearly illustrated in Fig. 1. The construction of the troughs 36 and the width of the wheels 37 are such that the objects are conveyed and discharged into the tubes 32 in single-file order and at intervals so that there is a spacing of the objects in the tubes 32 and, consequently, in the tubes 27. This results in an intermittent discharge of the objects from the nozzles N which is desirable to secure the proper scouring action of the bottles.

In practice, the bottle conveying mechanism operates to slowly rotate and advance the bottles in a single-file order along the platform, and as each bottle is positioned over a nozzle N it is subjected to an interior scouring by means of the fluid jets and scouring objects. While each bottle is passing from one nozzle to another, the corresponding nozzles continue to discharge jets of fluid and scouring objects upwardly between the bottles. To trap these jets and objects and to utilize them in scouring the exterior surfaces of the bottles, I provide a

hood H in the form of a metal casing secured on the angle bars 15 and 16 and providing a tunnel or passage through which the bottles B can move. The hood is in intimate relation to the bottles so that the fluid jets and scouring objects will be caused to have scouring contact with the exterior surfaces of the bottles and thereby effect a cleaning of the outer surfaces of the bottles. Guiding flanges 45 are secured within the hood H to deflect and guide the scouring objects downwardly through the slot of the platform or between the angle bars 15 and 16 so as to gravitate onto the screens 35 and ultimately into the troughs 36.

The pump 31 is driven from the shaft 42 by a mitre pinion 46 fixed to the pump shaft 47 and meshing with the gear 43. The pump 31 communicates with the tank T through a pipe 48 so that with the pump operating water is drawn from the tank and discharged under pressure through the pipe 30 and the several branch pipes 29 into the spouts 28. It will be understood that water emanating from the nozzles N flows back into the tank T to be again withdrawn therefrom by the pump 31. In this manner the same water may be used repeatedly.

Referring now to Figs. 5 and 6, I have here shown another form of conveying mechanism which may be substituted for the conveying mechanism shown in Figs. 1 and 2. This mechanism comprises a pair of endless chains 50 trained around horizontal sprocket wheels 51, it being understood that one of each pair of sprocket wheels is adapted to be driven to impart a continuous movement to the respective chain. Members 52 are secured to each chain at intervals along the length of the latter, and the members of one chain are adapted to coact with the members of the other chain in forming holders for the bottles so that they are positively maintained in upright position as they are fed along the platform. From a conveyor belt 53 the bottles are discharged into the pockets 54 of a wheel 55 and from the latter into the holders 52. With the chains 50 continuously driven in the direction of the arrows, the members 52 of one chain move into coacting relation with the corresponding members of the other chain to form the bottle holders and in such timed relation with respect to the discharge of bottles from the reel 55 that each holder receives a bottle in inverted position therein, and under the continued movement of the holder feeds the bottle along the platform so as to be successively presented to the several nozzles N. After traversing the platform the bottles are discharged from the holders by the separation of the two sections 52 constituting the holders.

Although I have herein shown and described only one form of bottle washing machine embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

I claim:

1. In a bottle washing machine, a washing nozzle, a conveyor adapted to position bottles successively over the nozzle, means for supplying a washing fluid under pressure to the washing nozzle to project a jet of fluid into each bottle, means for conducting scouring objects to said fluid supply means to utilize the fluid in delivering and projecting the objects to and from the nozzle into the bottles, means for delivering the objects to the first means in a single file-order, and means for conducting the objects from the bottles to the delivery means.

2. A bottle washing machine as embodied in claim 1 wherein the delivery means includes a wheel having a pocketed periphery, and means for rotating the wheel.

3. A bottle washing machine as embodied in claim 1 wherein the last means comprises a trough, and the delivery means a wheel having pockets in its periphery, said trough being inclined toward the periphery of said wheel to deliver the objects to said pockets, and means for rotating the wheel to elevate the objects as delivered and to discharge the objects into the first means.

4. In a bottle washing machine, a washing nozzle, a conveyor adapted to position bottles successively over the nozzle, means for supplying a washing fluid under pressure to the washing nozzle to project a jet of fluid into each bottle, a vertical pipe merging into the nozzle and into which scouring objects are adapted to be deposited and to be delivered into the stream of washing fluid for projection from the nozzle with the fluid, a wheel having its periphery so disposed that said pipe is tangent thereto, pockets in the periphery of the wheel, a trough for delivering the scouring objects to the periphery of said wheel after they have performed their scouring functions, and means for rotating the wheel to cause said pockets to conduct the scouring objects from said trough and to discharge them into said pipe.

5. In a bottle washing machine, a slotted platform, means for advancing a single line of bottles in an inverted position along the platform and over the slot, and nozzles beneath the platform for discharging jets of washing fluid upwardly into said bottles, successive nozzles being staggered and situated to discharge jets of washing fluid into the bottles at different points.

6. A bottle washing machine as embodied in claim 5 wherein means is provided by

which the bottles are rotated as they are advanced.

7. In a bottle washing machine, a platform having an opening therein, and upon which bottles in inverted position are adapted to be supported, conveying means for advancing the bottles over the platform and its opening, a portion of the surface of the platform at one side of the opening being roughened so that under the conveying movement of said means rotation of the bottles is effected, and nozzles for projecting jets of washing fluid into the bottles.

8. In a bottle washing machine, a platform having an opening therein and upon which bottles in inverted position are adapted to be supported over the opening, nozzles beneath the platform for projecting jets of washing fluid upwardly into the bottles, pipes for delivering washing fluid under pressure to the nozzles, vertical pipes adapted to conduct scouring objects to the first pipes into the fluid for projecting the objects from the nozzles, wheels arranged with respect to the vertical pipes so that the latter are tangent with respect to the peripheries of the wheels, pockets in the wheels for the reception of the scouring objects, foraminous troughs for receiving the scouring objects as discharged from the bottles and delivering the objects to the peripheries of said wheels, so as to be discharged into said pockets, means for rotating the wheels whereby the objects are conveyed and discharged into said vertical pipes, conveying means for advancing bottles on said platform, and means on the platform for causing the bottles to rotate as they advance.

9. In a bottle washing machine, a platform having an opening therein and on which bottles in inverted position are adapted to be supported over the opening, nozzles beneath the platform at intervals along the length thereof, means for advancing the bottles along the platform so as to be successively positioned over the nozzles, means for supplying a washing fluid under pressure to the nozzles, and means for supplying scouring objects to the fluid supplying means to be discharged from the nozzles with the washing fluid, and a hood encasing the bottles and trapping the washing fluid and scouring objects in a manner to cause the latter to have cleaning contact with the exterior surfaces of the bottles as the latter are being moved from one nozzle to another.

10. In a bottle washing machine, a platform having an opening therein, nozzles for discharging jets of water upwardly through said opening, and a mechanism for conveying bottles in inverted position along the platform over said opening comprising a pair of endless chains, and members secured to the chains at corresponding intervals so that under movement of the latter the members of one chain coact with the corresponding members of the other chain to form holders in each of which a bottle is received and moved along the platform.

Signed at Santa Barbara, in the county of Santa Barbara and State of California this 7th day of February, 1928, A. D.

FRANK B. REILY.