Feb. 8, 1955 R. O. SIEBERT 2,701,573

JET MECHANISM FOR CONTAINER WASHING MACHINES

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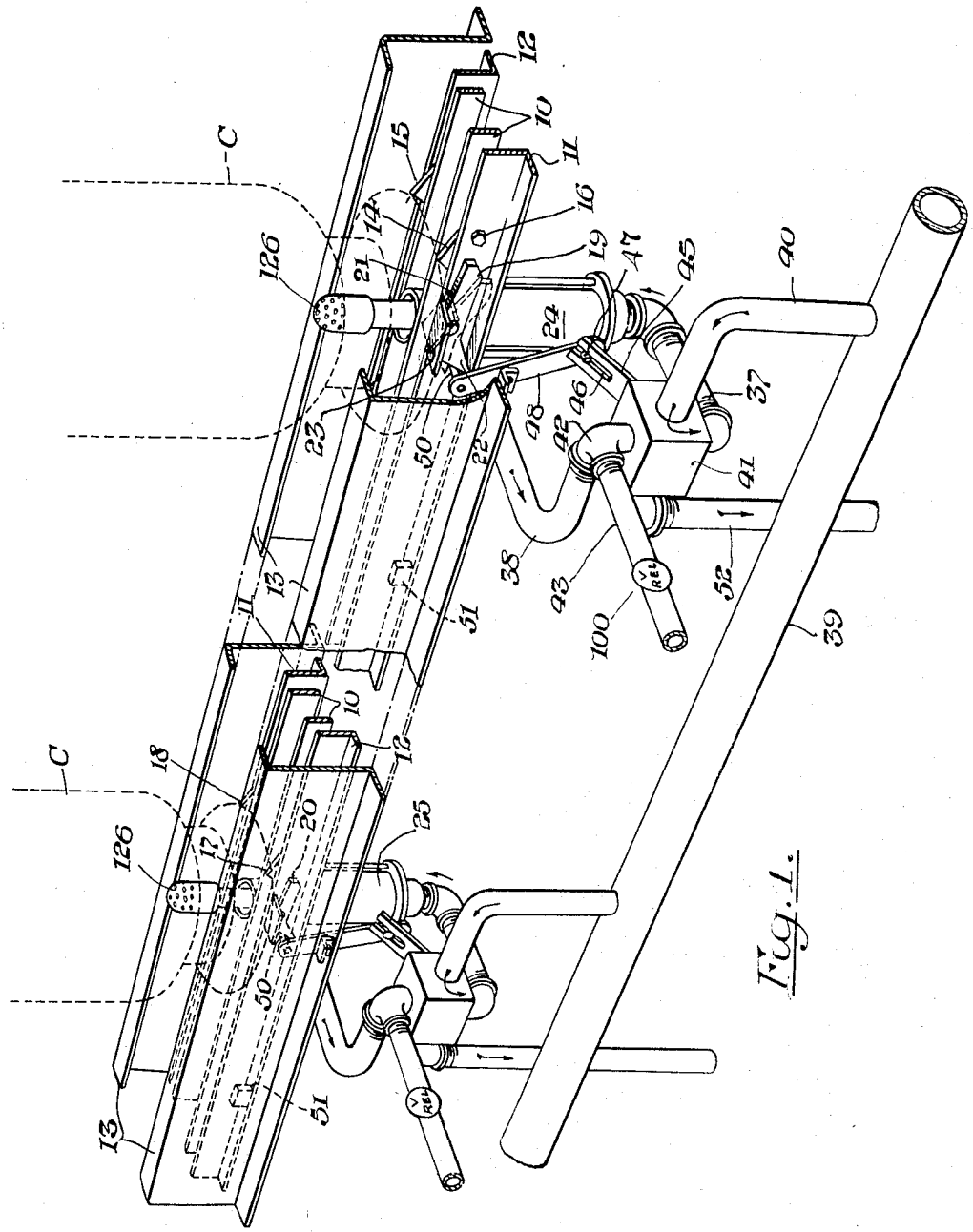


Fig. 1.

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Fig. 3.

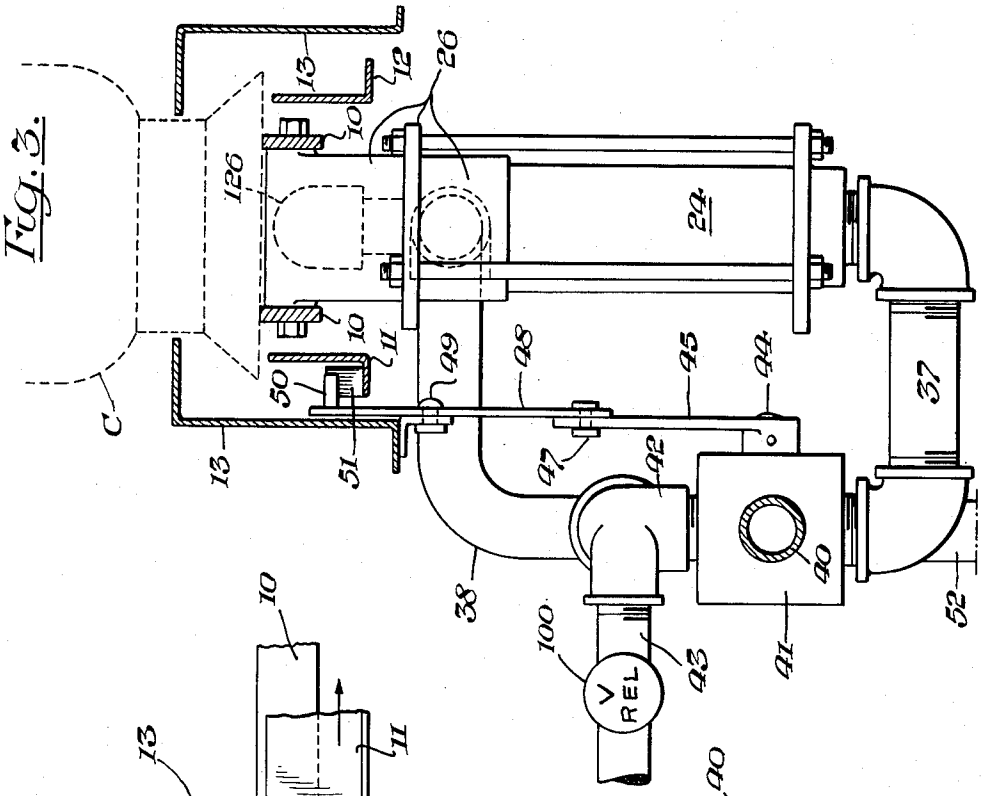
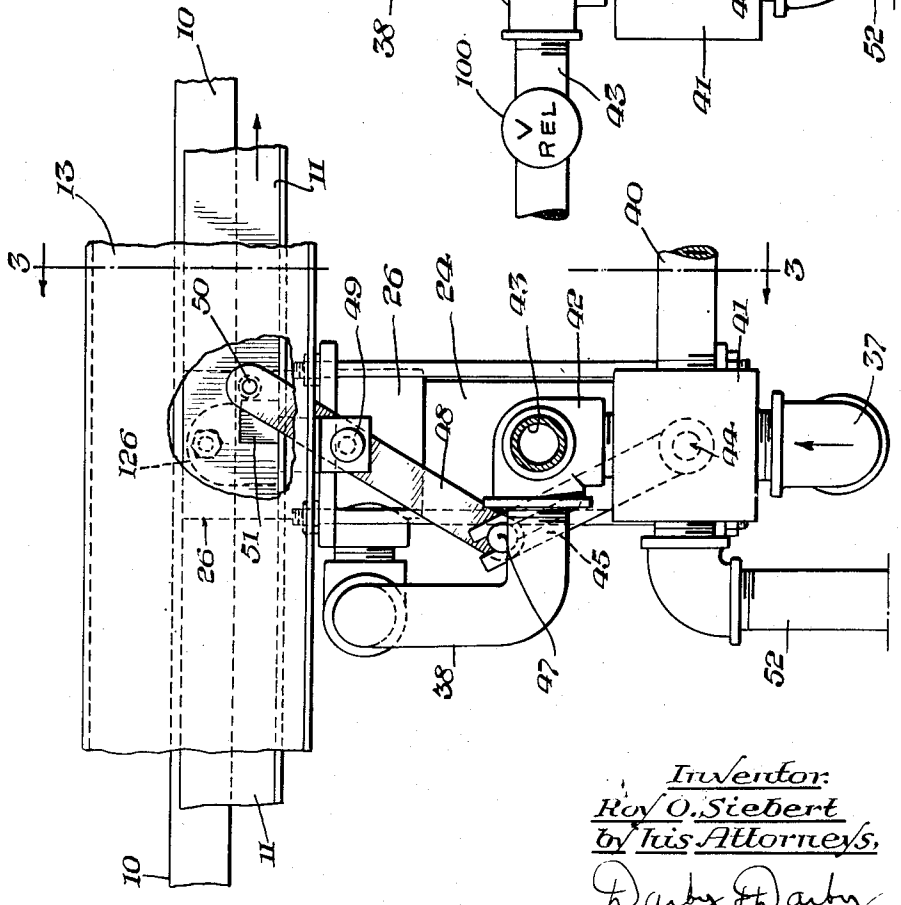


Fig. 2.



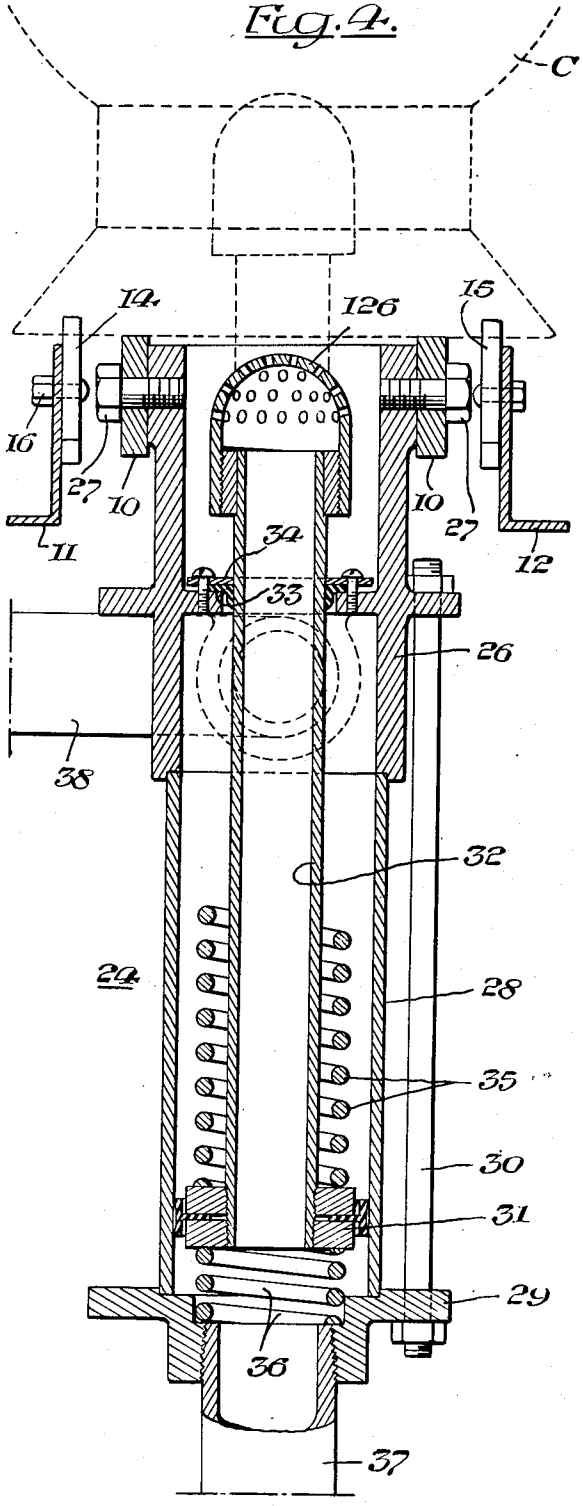
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JET MECHANISM FOR CONTAINER WASHING MACHINES

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Fig. 4.



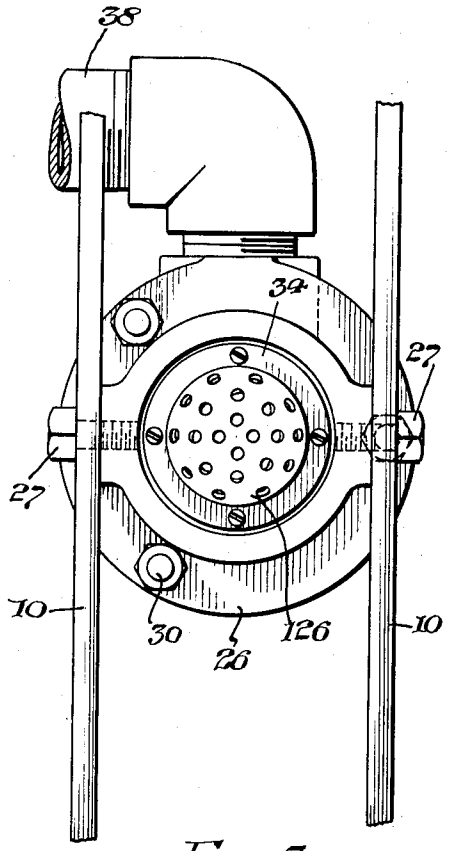


Fig. 5.

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2,701,573

JET MECHANISM FOR CONTAINER WASHING MACHINES

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Application January 29, 1952, Serial No. 268,879

10 Claims. (Cl. 134—49)

This invention relates to improvements in machines for washing containers such as milk can washers, in which a plurality of cans are successively and simultaneously advanced in intermittent steps to and from treating stations along a defined path for the purpose of washing, rinsing, sterilizing or otherwise processing them.

An object of this invention is to provide a simple, efficient, and relatively inexpensive washing and rinsing jet control mechanism actuated by and/or in conjunction with the step-by-step movement of the containers.

Another object of this invention is to provide control mechanism for a jet of this kind actuated by a force exerted by the containers in their movements to and from the processing stations in a manner so that the force exerted by the can will be utilized to minimize frictional wear of the can.

Another object is to provide a valve controlling mechanism actuated by the can movements and/or mechanism for moving the cans, whereby positive operation of the valve throughout its cycle is assured.

Another object of the invention is to effect the operation of this mechanism without tending to displace the containers from their proper positions for processing.

Another object of this invention is to provide a valve actuating mechanism for the washing jets, which is positively actuated in both its opening and closing movements in synchronism with the correct positioning of the cans at the processing stations.

A still more specific object is to provide correct timed operation of the washing and rinsing jets to insure that the containers are properly positioned at the processing stations, and a minimum use of washing, rinsing and sterilizing solutions.

A more specific object of the invention is to attain the above objects in conjunction with a vertically movable jet or nozzle, whereby it will be projected into the containers when properly positioned at the processing stations.

Other and more detailed objects of the invention will be apparent from the following disclosure of the form of the invention selected for illustrative purposes, as shown in the accompanying drawings.

In the accompanying drawings,

Figure 1 is a perspective view of the mechanism of this invention in operative association with a particular type of can washer, as will appear more fully below;

Figure 2 is a side elevational view with some parts in section and some parts broken away, showing more clearly the relationship of the parts illustrated;

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a vertical, central, cross-sectional view through the jet operating mechanism; and

Figure 5 is a fragmentary plan view of the structure of Figure 4;

As will be clear from the following disclosure the invention herein disclosed is not limited in its use to the washing of milk cans, although the disclosure will relate to such containers in the specific embodiment herein illustrated. The invention is, however, in its specific form most useful in washing containers while supported in their inverted position, that is with their open ends facing downwardly. In a straight line or inline washer the cans and covers are moved step by step from one treating station to the next at predetermined controlled time intervals by means of a reciprocating conveyor. The usual treatment for washing milk cans consists of spraying the cans and

covers from inside or outside, or both inside and outside simultaneously, at the various stations with rinse, wash or sterilizing solutions through suitably arranged jets or nozzles. The solutions being sprayed are sometimes of different composition and to prevent waste splash-over and intermixing of these various solutions, the flow through the jets at the various stations must be confined to the time intervals during which the cans repose at the processing stations. These generalizations are particularized in greater detail in United States Patent No. 2,522,310 granted September 12, 1950, to A. W. Smith.

As will appear hereinafter, the improvements of this invention are shown as applied to a can washer of the type disclosed in this patent. The jet controlling mechanism as disclosed in this patent is actuated by means of a spring loaded lever arranged to wipingly engage the can neck as it moves into a processing station in conjunction with suitable linkage for controlling the flow valves for the jets and/or the vertical movement of the jets in cases where rising jets are used. The control valves used with this mechanism are usually of the spring loaded, normally closed, poppet type. Thus considerable pressure must be exerted by the can upon the operating lever opposed to the path of the can neck, and an equal reactional force must be set up by the application to it of the guide plate or rail engaging the can on the opposite side from which it is engaged by the operating lever. Obviously the frictional forces ensuing from these pressures damage the tinned surfaces of the cans so as to expose the can bodies to corrosion, thereby not only rendering them unsightly, but weakening them to the point where they frequently develop leaks.

Another disadvantage of such a mechanism is that by reason of the nature of the processing, the operating mechanisms become gummed up or otherwise hard to operate, to such an extent that these frictional forces are magnified and the spring action of the poppet valves become sluggish, so that the nozzles do not shut off at the proper time. The result is that the wear on the cans is increased and the processing solutions are wasted or intermixed with the solutions at other stations, all of which, of course, is undesirable.

A broad object of this invention is, of course, to eliminate these difficulties and to gain other advantages, which will appear hereinafter.

As the invention herein disclosed is illustrated as applied to a machine of the type disclosed in Patent No. 2,522,310, only sufficient of the mechanism thereof is disclosed to show the new structural and operational relationships which result from the improvements herein disclosed. It does not follow, therefore, that the improvements herein disclosed are limited to use with the specific can washing mechanism disclosed in that patent and herein.

One type of straight line or inline washer includes a pair of fixed rails **10** extending longitudinally of the machine in parallel relation. Extending parallel to these rails and at opposite sides thereof are a pair of reciprocable dog bars **11** and **12**, which as illustrated are in the form of angle irons having one web thereof in a vertical plane and the other in a horizontal plane. The bars **11** and **12** are supported in any well known manner for longitudinal reciprocation by means of a power driving mechanism, likewise well known, and therefore not illustrated herein. They are arranged to lie parallel to the bars **10** with the top edge faces of the vertical webs in the same plane, but a plane which is lower than the plane in which the top edge faces of the bars **10** lie. At properly spaced longitudinal positions on the dog bars **11** and **12** are arranged in transverse alignment pairs of dogs **14** and **15** and **17** and **18**. Each of the dogs is pivotally mounted as at **16** in the case of the dog **14**, on its associated dog bar. These dogs are pivoted off center so that when unrestrained they will lie in the position shown in Figure 1, that is so as to project above the upper edges of the dog bars.

At this point it may be noted that two processing stations have been illustrated in Figure 1, it being understood that any desired number of these stations may be arranged in line at suitably spaced intervals, and that intermediate each of the stations illustrated there

may be provided a drainage station, as illustrated in the above patent.

Extending along the sides of the rail and dog bar assembly are a pair of guard rails which cooperate to limit the transverse movement of the cans C on the rails 10. These guard rails can take any suitable cross-sectional shape such as the shape shown by way of example.

At each of the treating stations, that is adjacent each of the spray nozzles 126, is a weighted trip dog 19, which is pivotally mounted, as at 21, on the dog bar 11. The corresponding trip dog 20 is shown for the other station illustrated. These trip dogs are pivoted off center so that they will normally lie in the position shown in dotted lines in Figure 1. Each trip dog has a plate 23 mounted thereon which normally lies on an inclined plane extending above the top edge of the rails 10, on which the container rests, which can be pushed down into the plane of the upper edge of these rails 10 by the container C, as illustrated in Figure 1, when the trip dog moves into the station. The forward end of each trip dog includes a downward projection 22, the purpose of which will be described later.

At each processing station there is, in the form of the invention illustrated, a rising jet mechanism as illustrated at 24 and 25, for the two stations shown. This mechanism is illustrated in full detail in Figures 4 and 5. For example, the rising jet mechanism 24 consists of a supporting fixture 26 attached at its upper end to opposed points on the inner faces of the fixed rails 10 by means of the cap screws 27. A cylinder 28 is seated at its upper end in fixture 26, and at the lower end in end cap 29 by a series of stay bolts 30, as illustrated.

Within the cylinder is a piston 31 of any suitable construction for operation in either direction by a pressure fluid. The piston is mounted upon a hollow piston rod 32 to the end of which is attached, in any suitable manner, a suitably shaped spray head 126. The fixture 26 is provided with an internal transverse wall intermediate its ends, having an aperture in which is mounted a sealing ring 33 held in place by means of an annular ring 34 and suitably shaped attaching screws. The hollow piston rod has a fluid-tight sliding fit with the sealing ring 33.

Resting at its lower end on the upper face of the piston 31 is a cushioning spring 35. Interposed between the lower face of the piston 31 and the end cap 29, is a cushioning spring 36 on which the piston rests when in inactive position, as illustrated in Figure 4. A pipe 37 is threadedly engaged in the aperture of the cap plate 29 and extends to one of the ports of a four-way valve 41, see Figure 1. This valve may be of any suitable and available form of construction as to internal form and porting. The fixture 26 has a threaded lateral port positioned below the transverse internal wall which defines the upper end of the active cylinder and has threadedly connected thereto a pipe 38 which connects to a coupling fixture 42, which in turn is connected to another of the ports of valve 41. Also connected to the coupling 42 is a drainage line 43 having a pressure relief valve 100 mounted therein.

At 39 is the main feed line for the spraying solution for the two jets illustrated. This line will be fed from a tank by a continuously operating pump, neither of which are shown, so that the spraying solution will be delivered therethrough under pressure. In the form illustrated in Figure 1, both sprays 126 are being fed with the same solution, but it is apparent that the sprays may be fed from different sources of the same kind, if desired, wherein different types of solutions may be supplied to the different sprays 126, as conditions require. As illustrated the main spray solution line 39 is connected to each valve 41 at its main inlet by means of the branch connection 40.

The operating valve stem 44 for the valve 41, see Figure 3, is provided with the operating lever arm 45 slotted at its upper end to receive a pin 47 mounted on the lower end of the lever 48. Lever 48 is pivotally mounted at 49 on a bracket secured to the lefthand guard rail 13, see Figure 3. This lever is pivotally mounted at 49 intermediate its ends so that the transverse pin 50 attached to its upper end can have an oscillating movement in a vertical plane. For each station there is attached to the dog bar rail 11 a lug 51,

each positioned so that it can engage the cooperating transverse projection 50 of the associated lever 48.

The final port of valve 41 is connected by a pipe 52 to provide a discharge connection which can deliver the fluid passing therethrough to waste or to a collection tank at atmospheric pressure. Each line 43 can also extend to waste, to the collection tank if one is used, to which the pipe 52 extends, or to a separate collection tank, none of which tanks are shown. These collection tanks can be common to two or more station jets or individual to each station jet, depending upon whether the same or different solutions are being delivered to the sprays.

In describing the operation of this device the steps will be started from the position in which the parts are shown, which is the most forward position of the dog bars 11 and 12. As a result of the movement of these parts to this position the containers C have been slid along the top edges of the fixed rails 10 by the engagement of the dogs 14 and 15 in one case, and 17 and 18 in the other, with the trailing rim of the neck of the containers C. As previously pointed out there may be a drainage station between the two sprays shown, in which case another set of dogs correpsonding to the dogs 14 and 15 will have moved an intermediate container to a point midway between the two spray stations shown. In this respect this description would be in accordance with the disclosure shown in the above mentioned patent.

As the reciprocating dog bars 11 and 12 return from the end of the can forwarding stroke shown in Figure 1, leaving cans C in their respective treatment stations, the depressed inclined plates 23 of the trip dogs 19 and 20, which are pivotally attached to the dog bar 11, soon lose contact with the rims of containers C and the trip dogs return to their normal position shown in dotted lines for the trip dog 19 in Figure 1. Near the end of the return stroke of the dog bars the inclined plates 23 of trip dogs 19 and 20 slidingly engage the rim of the next rearward container C, and gradually are moved down from the dotted line position to the full line position which places the projections 22 of the trip dogs again in a position to engage the pins 50 of the levers 48. Also, near the end of the return stroke of the dog bars, the stops 51 on dog bar 11 engage pins 50 of the levers 48 and return the valve 41 to the position shown in Figure 2, which shuts-off the solution supply to the nozzles or jets. Thus, at the end of the return stroke, which is the beginning of another can forwarding stroke, fluid supply to the spray nozzles is shut-off and the trip dogs are in readiness to move the valve operating levers 48 and 45 from the position shown in Figure 2, to the position shown in Figure 1, at the end of the can forwarding stroke.

The result is that the valves 41 are moved to the position where the spraying solution is supplied from the continuously operating pump, not shown, through the line 39 and branches 40, to the main inlet ports of the valves. The internal connections resulting from this operation of the valves opens the port to supply this fluid under pressure to the lines 37 and into the lower ends of the cylinders of the spray mechanisms 24 and 25. As a result, as for example in the case of spray mechanism 24, piston 31 will move upwardly and at the same time the spraying solution will pass through the hollow piston rod 32 to the spraying head 126. However, the spray is not delivered from this head in any quantity before it has moved into the flare end of the neck of the can, see Figure 4, with the result that as it continues to rise the solution will be sprayed progressively over the interior of the container from the lower to the upper end by the time the spray head 126 has reached its full elevation. To cushion the upper movement of the piston and spray head assembly, the spring 35 is provided.

This same setting of the valves 41 will connect the space in the cylinder 28 above the piston 31 with waste or collection tank. In other words, the exhaust pipe 38 to the upper end of the cylinder will be connected through the valve 41 to the discharge pipe 52.

While these operations are going on, the dog bars 11 and 12 will be returning to their extreme righthand position, Figure 1. The containers will remain at the processing stations, seated as they are on the elevated edges of the rails 10. The dogs 14 and 15 can, for example, be moved to a position to pick up the next container in the

line, because of their pivotal mounting on the dog bars. It will be seen that their outer edges incline upwardly, as shown in Figure 1, and hence as the dog bars move back, the dogs **14** and **15** will be depressed as they slide under the rim of the next can, and will again assume their full line position when the dog bars have completed their return stroke for the next operation. The trip dogs **19** and **20** will, of course, be carried along with the dog bars, but the valves **41** will remain in operated position until the dog bars have nearly completed their return stroke. As they approach completion of this stroke, the lugs **51** will engage the pins **50** on the levers **48** and return them to the position shown in Figure 2.

The valves **41** will therefore be operated to their other position, in which position the branches **40** will be disconnected from the pipes **37** and connected to the pipes **38**, and at the same time the pipes **38** will, of course, be disconnected from the pipes **52** and the pipes **37** will be connected to pipes **52**. The result of this switch in connections is that the fluid under pressure will be supplied from the branches **40** through the valves **41** to the couplings **42**, and from them through the branches **38** to the upper ends of the cylinders of the spray mechanisms. Thus fluid under pressure will be applied to the upper faces of the pistons, causing them to move downwardly. Just as they complete their downward stroke they will engage the cushioning springs **36** to absorb the shock of their stop. During the downward movement of the piston assemblies, the fluid in the lower ends of the cylinders will be forced out through the branches **37**, valves **41**, and into the branches **52**, from which they will either go to waste or to a collection tank or tanks, not shown.

Upon consideration it will be seen that upon the downstrokes of the pistons, assuming continuously running constant volume supply pumps, the amount of fluid under pressure being supplied to the upper faces of the pistons will be more than enough to effect their operation. This is due to the fact that the capacity of the pump or pumps must be such as to supply sufficient fluid to raise the piston and also supply the spray heads **126**. Therefore, on the downward stroke of the pistons there will be a tendency to build up excessive pressure in the branches **38**, and for this reason the discharge branches **43** with their pressure relief valves **100**, are provided so that the excess fluid will be drained off to waste or to a collection tank or tanks, not shown, for reuse. Also, since the valves will remain in this operated position during the next can feeding stroke, it will be necessary to provide relief in the pressure fluid lines and during this time (the pistons now being in their most downward position), the fluid being pumped will pass from the line **39** through the branches **40**, valves **41** to the fittings **42**, and thence out through the branches **43** and relief valves **100**, as before. Briefly stated, the relief valves provide a pressure equalizing arrangement for the entire cycle of operation of the mechanism.

Those skilled in the art will appreciate that the relative position and proportioning of the parts and the timing of the movements of the dog bars will all be arranged so that spraying will not occur until the containers are properly positioned at their stations, and will be completed at the time the containers are moved again. Thus, there will be a minimum of wastage of fluid with a minimum effort derived from containers to effect operation of the spray valves.

It is within the scope of this invention to apply the same type of control for the valves which feed the sprays or nozzles in that type of wash machine in which the spray heads or nozzles are not projected into the containers. In other words, there are known forms of container washers in which the spray heads or nozzles are fixed. It will be apparent that the same combination as herein disclosed can be supplied to control the supply valves for these spray heads or nozzles without departing from the scope of the novel subject matter herein disclosed.

As other changes in the details of construction and operation can be effected by those skilled in the art without departure from the novel subject matter herein disclosed, I do not desire to be limited to the specific illustrated embodiment, but only as required by the appended claims.

What is claimed is:

1. In a machine providing an article spraying station, a guideway for the articles to be sprayed, a nozzle mounted at the spraying station, article advancing means for intermittently moving articles along said guideway to successively position them at the spraying station, means for supplying a fluid under pressure to said nozzle, means actuated conjointly by the article and the article advancing means for actuating said fluid supplying means when the article reaches the spraying station to deliver said fluid to said nozzle, and means actuated by said conjointly actuated means for moving the nozzle vertically when the article reaches the spraying station.

2. In a spraying machine as described, the combination with an article guideway and a reciprocable conveyor for moving the articles successively and intermittently along said guideway to and from a processing station, of a spraying nozzle at said station, a source of spraying solution under pressure, means actuated by said conveyor in moving an article to said spray station for connecting said spray nozzle to said source and for disconnecting said spray nozzle from said source preparatory to initiating the movement of the next article to said station, a pressure fluid motor having a vertically reciprocable piston rod on which said nozzle is mounted, said means actuated by said conveyor also connecting said motor to said source to cause the nozzle to move vertically of said article when it is at said station.

3. In a spraying machine as described, the combination with an article guideway and a reciprocable conveyor for moving the articles successively and intermittently along said guideway to and from a processing station, of a pressure fluid motor at said station having a vertically movable piston, a nozzle mounted on said piston, a source of spraying solution under pressure, and means actuated by said conveyor and moving an article to said station for connecting said nozzle and motor to said source to elevate the nozzle and for disconnecting said nozzle and motor from said source and connecting the motor to said source to depress the nozzle in preparation to initiate the advance of the next article to said station.

4. In a spraying machine the combination of an article guideway and a reciprocable conveyor for intermittently advancing articles along said guideway to and from spraying stations on the guideway, of a cylinder mounted at each station having a piston and a piston rod, a spray head on each piston rod, a source of spraying solution under pressure, fluid connections for each end of said cylinder including a valve operable to alternatively connect said source to the ends of said cylinder and the opposite ends of said cylinders alternatively to exhaust, a fluid connection from said source to said spray head, and means operated conjointly by said conveyor and articles on said guideway for so operating said valve.

5. In the combination of claim 4, a pressure relief valve in the connections to one end of said cylinder.

6. In the combination of claim 4, said piston and piston rod having a passage therethrough, said passage comprising the fluid connection to the spray head.

7. In the combination of claim 4, means in each cylinder on opposite sides of said piston for cushioning the pistons at the end of their stroke in either direction.

8. In the combination of claim 4, said last means comprising an operating linkage system for each valve, a pivoted trip dog on the conveyor for each valve, and a lug on the conveyor for each valve whereby reciprocation of said conveyor effects alternative operation of the valves to each of their two operating positions.

9. In a machine providing an article spraying station, a guideway for the articles to be sprayed, a nozzle mounted at the spraying station, fluid pressure operated means for moving said nozzle vertically of the article when at said station, article advancing means for intermittently moving the articles along said guideway to successively position them at the spraying station, means for supplying a fluid under pressure to said nozzle and nozzle moving means, and means actuated conjointly by said article and said article advancing means and as an incident to the movement of the article to the spraying station for actuating said means for supplying a pressure fluid to cause the nozzle to be raised and to supply a spray solution thereto.

10. In a machine providing an article spraying station, a guideway for the articles to be sprayed, a vertically arranged cylinder at said spraying station, a piston in said cylinder, a hollow piston rod connected to said piston, a nozzle on said hollow piston rod and arranged to discharge against said articles, article advancing means for intermittently moving the articles along said guideway to

successively position them at the spraying station, means for supplying a fluid under pressure to said hollow piston rod and nozzle and also against said piston, and means operated as an incident to the movement of the article to the spraying station for actuating said fluid supplying means to apply fluid under pressure against said piston and thereby raise said nozzle, and to supply fluid under pressure through said hollow piston rod to said nozzle.

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