

[54] CONTAINER WASHING APPARATUS

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[22] Filed: July 20, 1970

[21] Appl. No.: 56,538

[52] U.S. Cl. 134/143, 134/145, 134/152, 134/170, 134/175, 134/200

[51] Int. Cl. B08b 3/02, B08b 9/08

[58] Field of Search 134/143, 144, 145, 152, 165, 134/170, 171, 175, 177, 200

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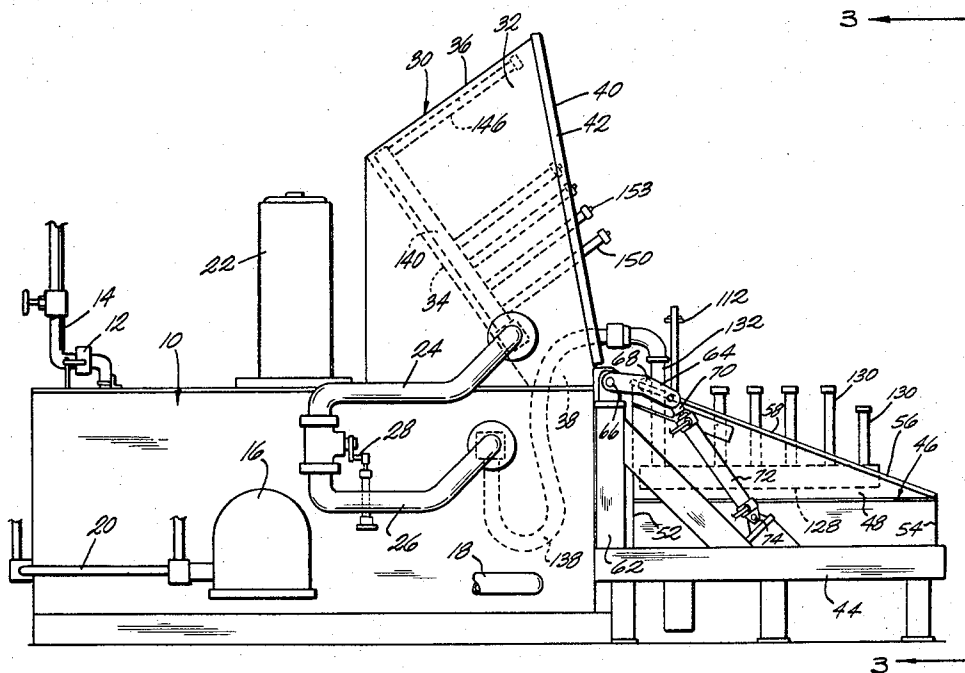
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[57]

ABSTRACT

A device for washing industrial gondolas consisting of two receptacles each open at one end and forming half sections of a gondola washing chamber. One of the sections is adapted to be pivoted from an open position to a position closing with the other section to form the washing chamber. The movable section has a platform on which a gondola is adapted to be clamped and arranged to support the gondola in a generally inverted position when the sections are closed. The two sections have sets of nozzles thereon arranged for directing high pressure jets of washing liquid against the inner and outer sides of all the gondola walls.

5 Claims, 8 Drawing Figures



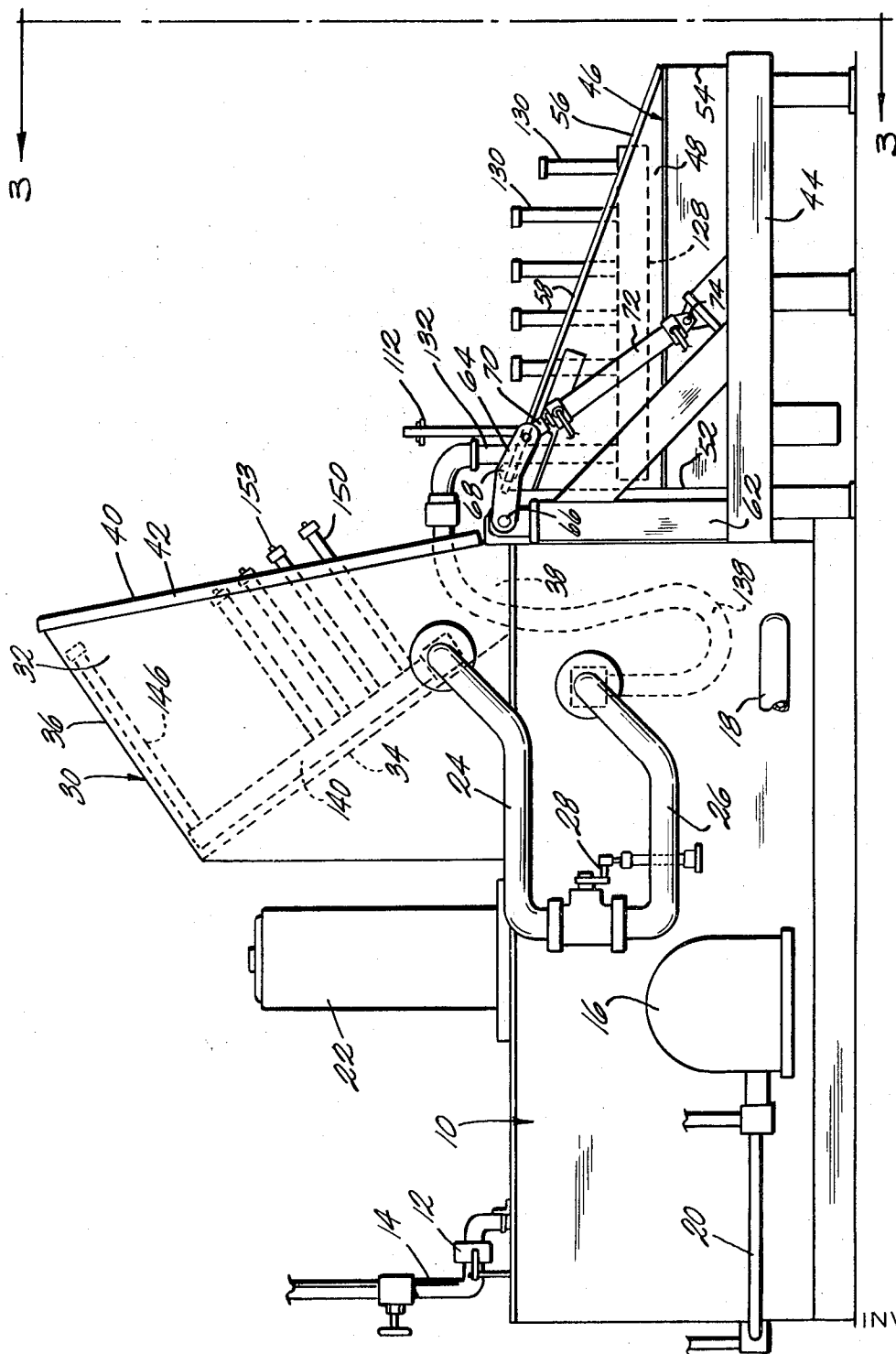


FIG. 1

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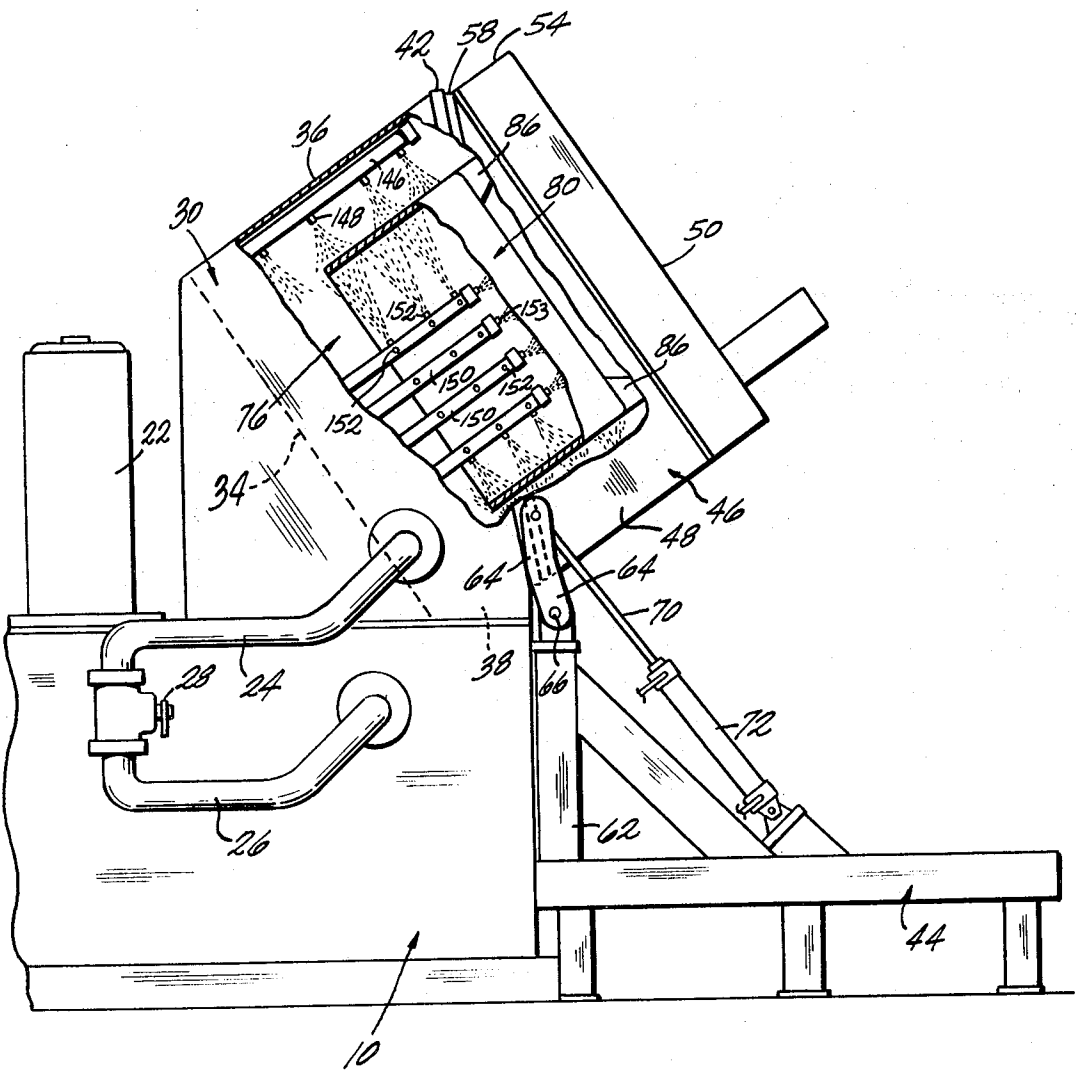


FIG. 2

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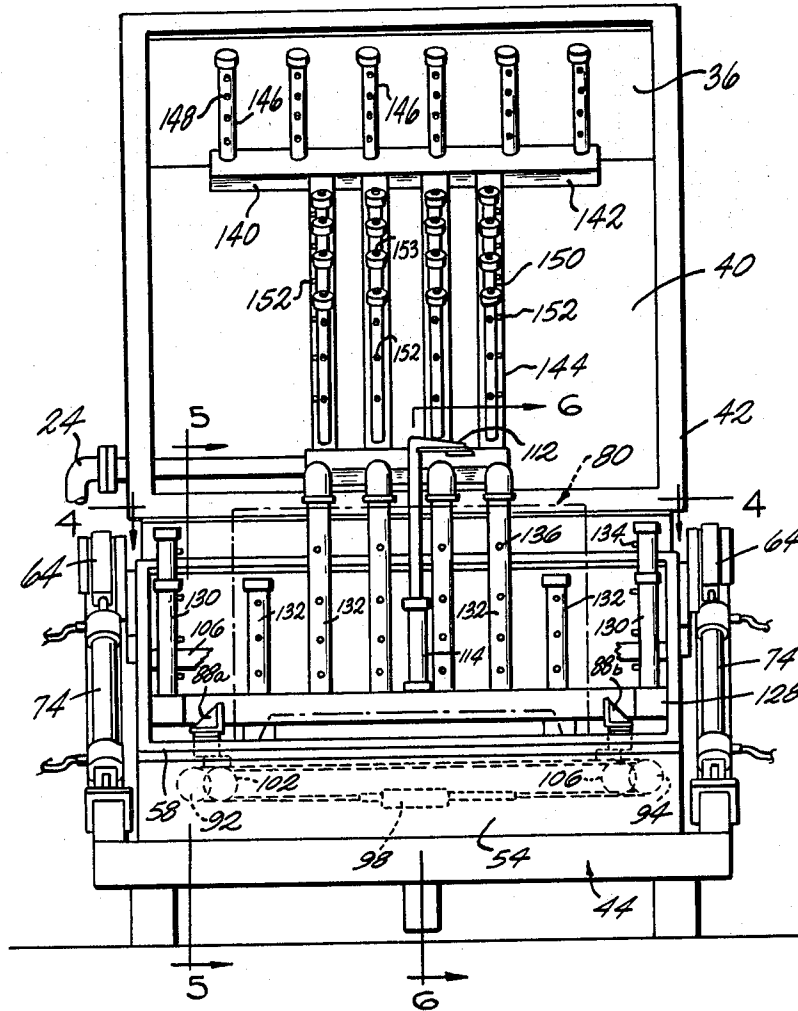


FIG. 3

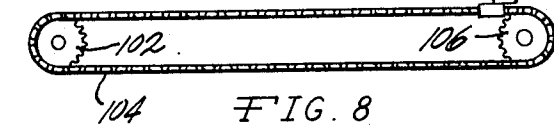
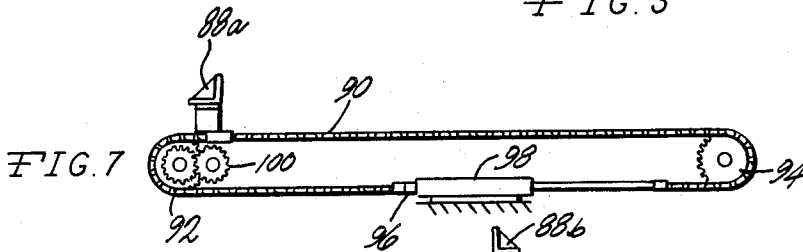


FIG. 8

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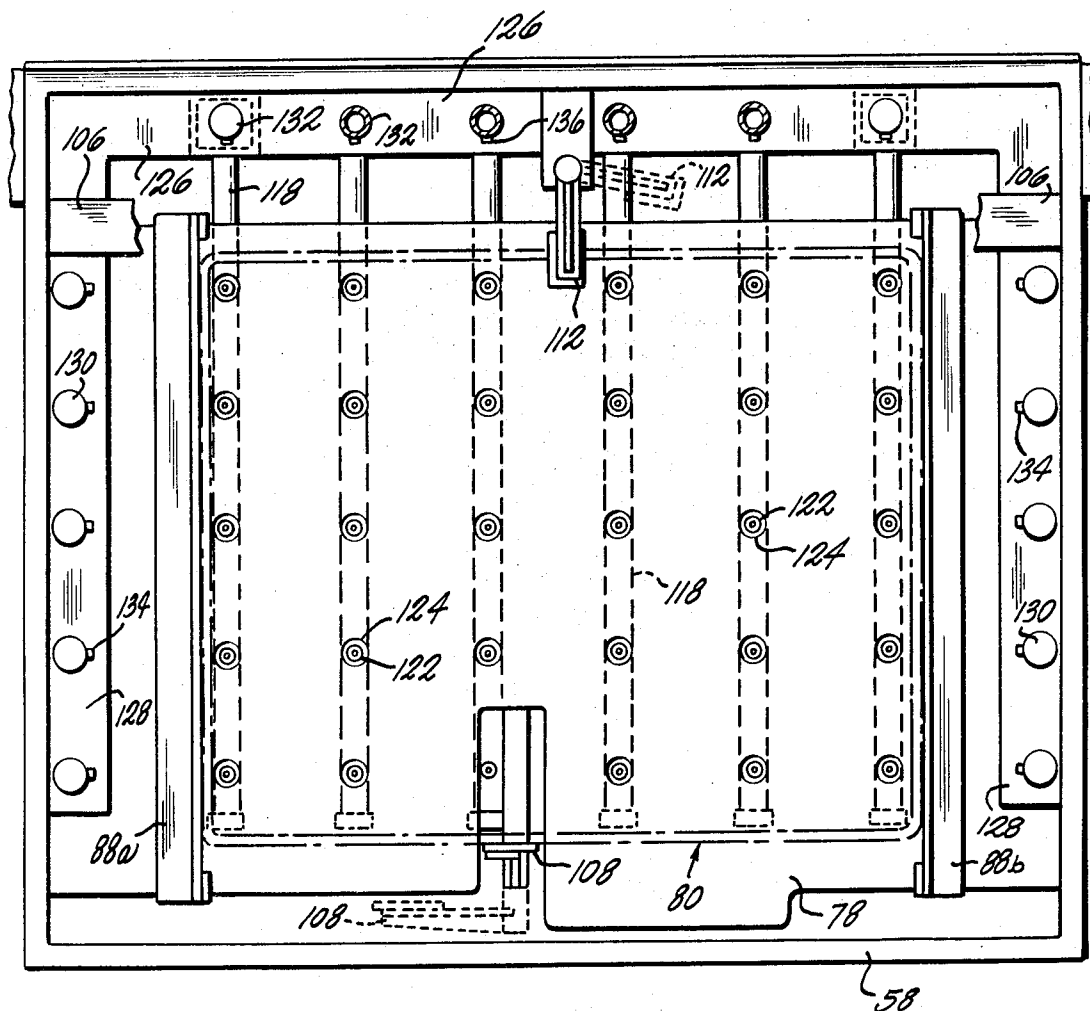


FIG. 4

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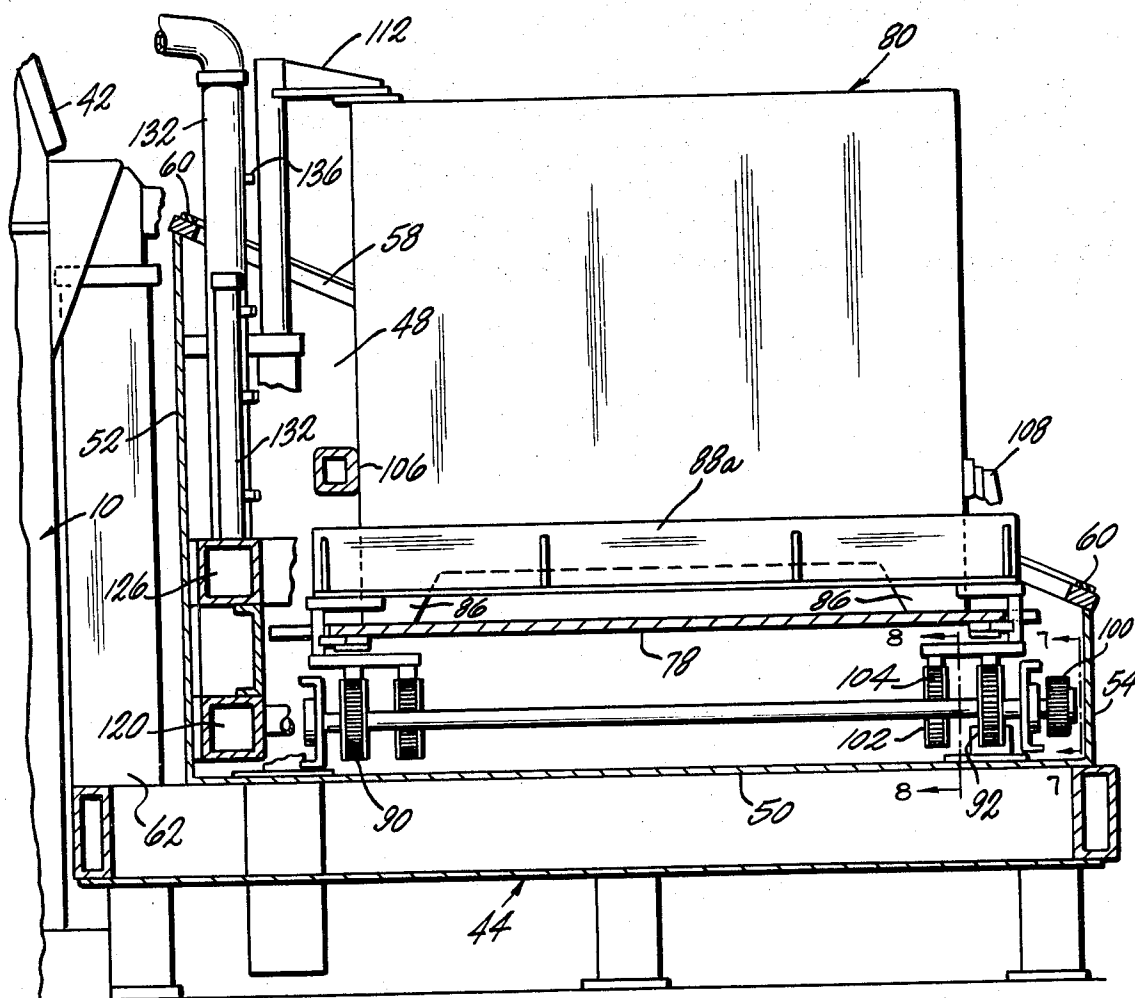


FIG. 5

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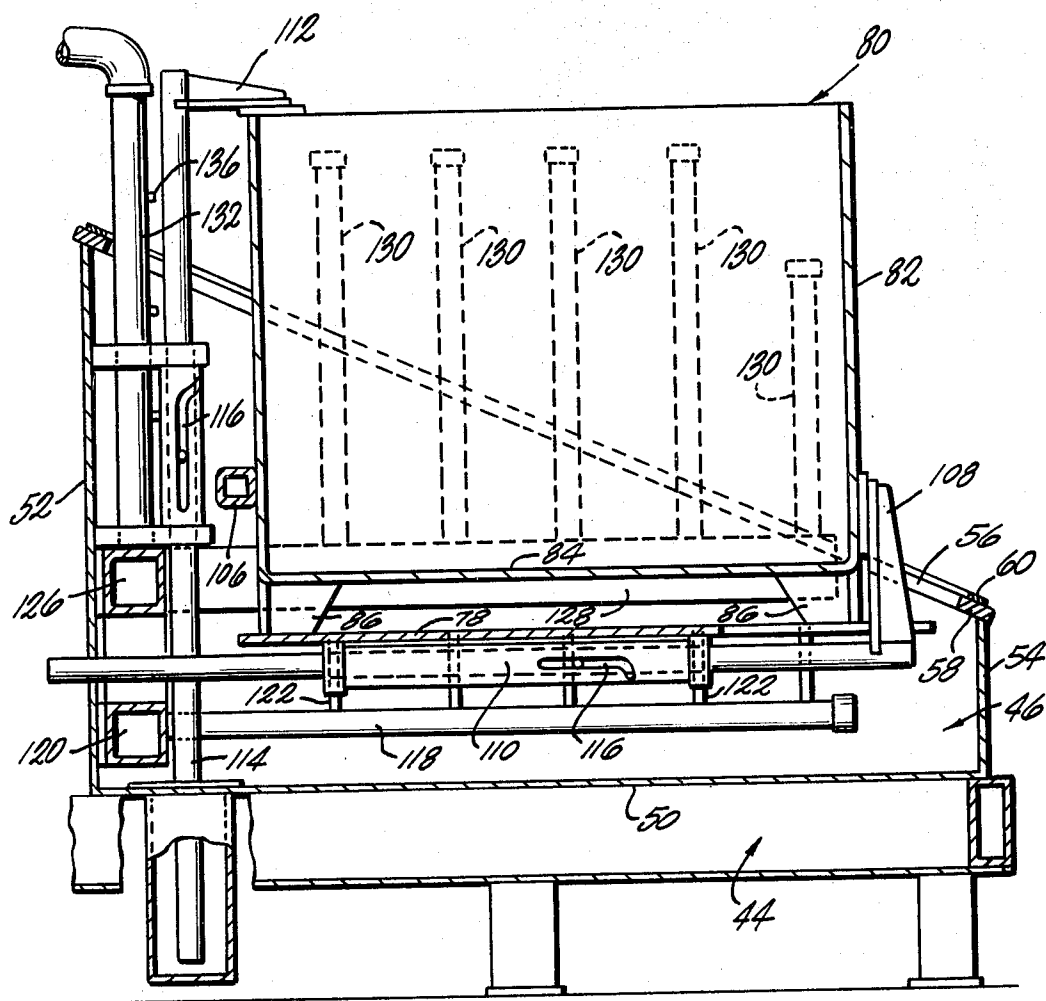


FIG. 6

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CONTAINER WASHING APPARATUS

This invention relates to a device for cleaning industrial receptacles and, more specifically, to a machine for washing the inner and outer sides of gondolas used in industrial operations for the storage of workpieces.

In manufacturing operations sheet metal gondolas are frequently used for storing partially processed and finished workpieces. After a period of time such gondolas become quite soiled with oil, chips, dirt, etc. and require cleaning.

It is the object of the present invention to provide an apparatus for cleaning the inner and outer surfaces of such gondolas efficiently and economically.

More specifically, it is an object of the present invention to provide an apparatus of the type described which is constructed so that a gondola can be placed therein in its normal upright position and thereafter the apparatus is manipulated so as to at least partially invert the gondola and direct high pressure jets of washing liquid against all the interior and exterior surfaces of the gondolas.

A further object of the invention is to provide an apparatus of the type described which includes two receptacle-forming sections which are relatively movable from an open position wherein a gondola can be placed in one of the sections in a normal upright position and to a closed position forming a closed washing chamber in which the gondola is in at least a partially inverted position.

Other features and objects of the invention will become apparent from the following description and drawings, in which:

FIG. 1 is a side elevational view of a gondola washing apparatus according to the present invention with the washing chamber open.

FIG. 2 is a fragmentary side elevational view similar to FIG. 1 and showing the washing chamber closed.

FIG. 3 is an end view of the apparatus as viewed along line 3—3 in FIG. 1.

FIG. 4 is a sectional view along line 4—4 in FIG. 3.

FIG. 5 is a sectional view along line 5—5 in FIG. 3.

FIG. 6 is a sectional view along line 6—6 in FIG. 3.

FIGS. 7 and 8 show in a somewhat schematic way the means for centering the gondola in the machine as generally viewed along lines 7—7 and 8—8, respectively, in FIG. 5.

Referring to FIG. 1, the machine generally comprises a tank 10 in which the washing liquid, such as water containing suitable cleaning agents, is contained. The level of washing liquid in tank 10 is maintained by a float valve 12 in an inlet line 14. An air heater 16 at one side of the tank has its outlet connected with a heat exchanger tube 18 which extends into and through the tank for heating the liquid therein to a desired high temperature. The air and fuel inlet line for burner 16 is designated 20. A pump 22 is utilized for circulating the heated washing liquid through the tank and the hereinafter described washing chamber. The outlet of pump 22 is connected with a pair of conduits 24, 26 controlled by a valve mechanism 28.

Adjacent one end of tank 10 there is mounted a receptacle-forming compartment 30. Compartment 30 includes side walls 32, a bottom wall 34 and an upper end wall 36. The interior of compartment 30 connects with and is adapted to drain into tank 10 at the lower end portion thereof designated 38. One face of compartment 30 is open as at 40, the opening being defined by a peripheral flange 42 extending around the edges of walls 32, 36. As shown in FIG. 1, the open side 40 of compartment 30 lies in a plane inclined slightly to the vertical.

At the end of tank 10 adjacent compartment 30 there is provided a horizontally extending support platform 44 on which a second compartment 46 is adapted to be supported. Compartment 46 includes side walls 48, a bottom wall 50 and end walls 52, 54. One side of compartment 46 is open as at 56, the opening being defined by a peripheral flange 58 extending around the edges of walls 48, 52, 54. Flange 58 is provided with a rubber seal 60 thereon extending around opening 56 (FIG. 6). Adjacent the end of tank 10 there is arranged on platform 44 a pair of upright columns 62, one at each side of compartment 46. Links 64 are pivotally connected to columns 62 as at 66 and are connected to opposite sides of compartment 46 as at

68. Each link 64 is connected at its free end to the piston rod 70 of a hydraulic cylinder 72. Cylinders 72 are pivotally supported on platform 44 as at 74. When cylinders 72 are actuated to extend piston rods 70, compartment 46 is pivoted from the position shown in FIG. 1 to the position shown in FIG. 2. In the latter position compartments 30 and 46 define a receptacle 76 of generally cubical shape which is sealed around the flanges 42, 58 and which is open to tank 10 at section 38. Compartments 30 and 46 thus generally define diagonal half sections of cubical compartment 76.

Referring now to FIGS. 5 and 6, a platform 78 is fixedly mounted in compartment 46 at a level spaced horizontally above bottom wall 50. Platform 78 is disposed at a level only slightly below the upper end of the front end wall 54 of compartment 46. Platform 78 is generally rectangularly shaped and is adapted to support a gondola 80 thereon. Gondola 80 is of a conventional type having four side walls 82, a bottom wall 84 and foot members 86 for supporting the gondola with the bottom wall 84 in a position elevated from the support floor for the gondola. A pair of sliding centering bars 88a and 88b are arranged on platform 78 for movement laterally toward and away from one another. Bar 88a is connected at opposite ends to a pair of chains 90 extending around sprockets 92, 94. The opposite ends of one chain 90 are connected to the opposite ends of a double acting piston rod 96 in a hydraulic cylinder 98. A spur gear 100 on the shaft of sprockets 92 has a driving connection with a shaft on which additional sprockets 102 are mounted. Endless chains extend around sprockets 102 and sprockets 106 and are connected to the ends of other centering bar 88b. When cylinder 98 is actuated centering bars 88a and 88b are shifted toward and away from one another. With a gondola 80 supported on platform 78, when cylinder 98 is actuated to shift bars 88a and 88b toward each other, the gondola is centered on the platform.

Within compartment 46 there is arranged a bumper bar 106 extending horizontally above platform 78 along a line spaced inwardly from the upright rear end wall 52. Bumper bar 106 is adapted to locate gondola 80 on platform 78 in a fore and aft direction. A clamp 108 actuated by hydraulic cylinder 110 below platform 78 is arranged when actuated to clamp against the front wall of gondola 80 and shift the gondola on platform 78 into engagement with bumper bar 106. The gondola is adapted to be clamped vertically downwardly on platform 78 by a clamp 112 actuated by a vertically extending cylinder 114 mounted within compartment 46 just to the rear of bumper bar 106 (FIG. 6). Clamps 108, 112 are connected with their respective cylinders by means of angularly slotted guideways 116 so that when the respective cylinders are actuated the clamps are shifted axially and rotated to the clamping position. For example, in FIG. 4 clamps 108 and 112 are shown in the clamping position in solid lines and in the pivoted out-of-the-way position in broken lines.

Beneath platform 78 there is arranged in compartment 46 a plurality of pipes 118 connected at one end to a manifold 120. On each pipe 118 there is mounted a plurality of upstanding nozzles 122 which project through openings 124 in platform 78. Manifold 120 is connected with a U-shaped manifold 126 spaced above platform 78 and extending along each side wall 48 and the rear wall 52 of compartment 46. The legs of manifold 126 extending along the side walls of compartment 46 are designated 128. A plurality of upright pipes 130 are connected with the manifold legs 128 and another plurality of upright pipes 132 are connected with the rear horizontal portion of manifold 126. Pipes 130 are fitted with a plurality of vertically spaced nozzles 134 which are directed inwardly toward each other and pipes 132 are likewise provided with a plurality of vertically spaced nozzles 136 which are directed forwardly. Manifold 126 is connected with the outlet pipe 26 from pump 22 by means of a flexible conduit 138 which extends from the upper ends of some of pipes 132, into compartment 30 and then into tank 10 through the drain section 38.

Within compartment 30 there is arranged a manifold 140. Manifold 140 has one section 142 thereof extending along the

end wall 36. A plurality of parallel branch manifold pipes 144 are connected with manifold section 142. Upright pipes 146 extending generally parallel to end wall 36 of compartment 30 are connected with section 142 of manifold 140. Pipes 146 are provided with a plurality of vertically spaced nozzles 148 which are directed forwardly and downwardly. Each branch manifold section 144 is also provided with a plurality of upstanding pipes 150 having vertically spaced nozzles 152 and nozzles 153 at their ends. Pipes 150 define a generally rectangularly shaped pattern and the nozzles on the pipes defining the outer periphery of this rectangular pattern are directed outwardly as shown in FIGS. 2 and 3. Nozzles 152 at the corner pipes 150 are arranged in two perpendicularly related groups.

Piston rods 70 of cylinders 72 are normally in the retracted position so that compartment 46 assumes the open position illustrated in FIGS. 1 and 6 with platform 78 horizontally disposed. In this position a gondola 80 is adapted to be deposited on platform 78 by means of a fork lift truck. It will be observed that the portion of peripheral flange 58 at the upper edge of end wall 54 of compartment 46 is disposed at a level below bottom wall 84 of the gondola so that after the gondola is deposited on the platform the tines of the fork lift truck may be readily retracted. Thereafter cylinder 98 is actuated to cause the centering bars 88a, 88b to move inwardly toward each other, engage the gondola and center it on platform 78. After the gondola is centered on the platform, cylinder 110 is actuated to shift clamp 108 to its operative position and clamp the gondola securely against the back bumper bar 106. Thereafter cylinder 114 is actuated to pivot clamp 112 to its operative position and draw it downwardly against the upper edge of the gondola to firmly clamp the gondola on platform 78.

After the gondola is securely clamped to the platform 78 in this manner cylinders 72 are actuated to extend piston rods 70. As the piston rods 70 are extended compartment 46 is pivoted upwardly about pintles 66 to the closed position illustrated in FIG. 2 so that the two compartments form the enclosed chamber 76 which is effectively sealed around flanges 42, 58 by the sealing strip 60. As compartment 46 is pivoted to the closed position the open upper end of gondola 80 telescopes over the upright pipes 150 in compartment 30. Thus, in the closed position of the receptacle pipes 150 extend into the generally inverted gondola from the open end thereof and toward the bottom wall 84 of the gondola. Pipes 130 are located along the outer faces of two opposite side walls of the gondola. Pipes 146 are disposed along the outer face of one end wall and pipes 132 along the outer face of the other end wall of the gondola.

Pump 22 is then operated to direct heated washing liquid to the two manifolds. In the arrangement illustrated valve 28 is employed so that the hot washing liquid is directed first through one of the manifolds for a predetermined time interval and then through the other manifold. Valve 28 is utilized to eliminate the need for an excessively large pump 22. When the washing liquid is directed through outlet pipe 26 it flows into pipes 132, manifolds 120 and 126 and into pipes 130 and 118. Nozzles 122 on pipes 118 direct jets of washing liquid against the bottom face of bottom wall 84. Nozzles 134 on the two sets of pipes 130 direct high pressure jets of washing liquid against the outer faces of two side walls of the gondola. Nozzles 136 on pipes 132 direct high pressure jets of washing liquid against the outer side of the gondola wall which abuts bumper bar 106. Thus, the nozzle arrangement in compartment 46 directs washing liquid against the outer faces of three side walls of the gondola and the bottom wall thereof.

When the hot washing liquid is directed through outlet pipe 24 it flows into manifold 140 with its branch pipes 142, 144. Nozzles 148 on pipes 146 direct high pressure jets of washing liquid against the outer face of the side wall 82 of the gondola engaged by clamp 108. Nozzles 152 on pipes 150 direct high pressure jets of washing liquid against the inner faces of all four side walls of the gondola and nozzles 153 direct high pres-

sure jets of washing liquid against the inner face of the bottom wall 84 of the gondola. As indicated in FIG. 2, with the compartment 76 in the closed condition the walls of the gondola are inclined so that the washing liquid drains readily therefrom. Likewise the walls of compartments 30 and 46 are inclined to insure drainage of the liquid through the drain section 38 back into tank 10.

After the washing cycle is completed the sequence of operations is reversed. Cylinders 72 are first actuated to pivot compartment 46 to the open position illustrated in FIG. 1. Thereafter, the cylinders controlling centering bars 88a, 88b and clamps 108 and 112 are actuated to release the gondola so that it can be lifted from platform 78 and withdrawn from within compartment 46 by means of a fork lift truck.

Since such gondolas are normally transported throughout a plant by means of fork lift trucks, no special or additional equipment is required to deposit the gondolas into or remove them from the washing apparatus of this invention. This is made possible by the fact that in the open position compartment 46 is open at the top and is also substantially completely open at the end thereof defined by end wall 54.

I claim:

1. Apparatus for washing large containers, such as industrial gondolas, of the type having a bottom wall, upright side walls and an open upper end, said apparatus comprising a pair of chamber forming sections each of which is open at one end, one of said sections being supported for movement in a generally arcuate path from an open position wherein the sections are separated to a closed position wherein the open ends of the sections are juxtaposed to define an enclosed washing chamber, said movable section when in open position having generally horizontally extending support and also having a bottom wall spaced below said support, said movable section also having an upright rear wall extending substantially above said support and an upright front wall terminating at its upper end adjacent the plane of said support so that the support is unobstructed at the front side thereof to enable placement of a gondola in its normal upright position on said support from the front side of said movable section by means of a forklift truck, said two sections having other walls cooperating to form a generally cubical closed compartment when the sections are closed, means for clamping a gondola on said support in said upright position, said support being inclined in the closed position of said movable section such that the gondola secured thereto is disposed with its open end facing downwardly, said sections being dimensioned so that when in closed position the side walls of the gondola clamped on said support are spaced inwardly of the side walls of the chamber formed by the two sections, and means on the two sections for directing high pressure jets of washing solution against the walls of the gondola when the sections are in closed position comprising, a plurality of upright spray pipes on said movable section adjacent and spaced forwardly of the rear wall thereof for spraying the outer side of the rear wall of the gondola, a plurality of upright spray pipes on the other section positioned to project into the gondola when the sections are closed for spraying the inner sides of the gondola side walls and bottom wall, a plurality of upright spray pipes on said other section positioned for spraying the outer side of the front wall of the gondola and other upright spray pipes on at least one of said sections for spraying the outer sides of the other two side walls of the gondola.

2. An apparatus as called for in claim 1 wherein each of said sections comprises a generally diagonal half section of the chamber, the upper edges of the side walls of the movable section inclining downwardly and forwardly from the upper edge of the rear wall thereof to the upper edge of the front wall thereof.

3. An apparatus as called for in claim 1 wherein said one section is supported for pivotal movement from open to closed position.

4. An apparatus as called for in claim 1 wherein said last-mentioned spray pipes are located on the movable section.

5 An apparatus as called for in claim 1 including a set of spray nozzles on the movable section for directing jets of washing liquid against the under side of the bottom wall of the gondola.

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