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3,537,897

TUBING WASHER AND METHOD

Filed March 13, 1967

3 Sheets-Sheet 1

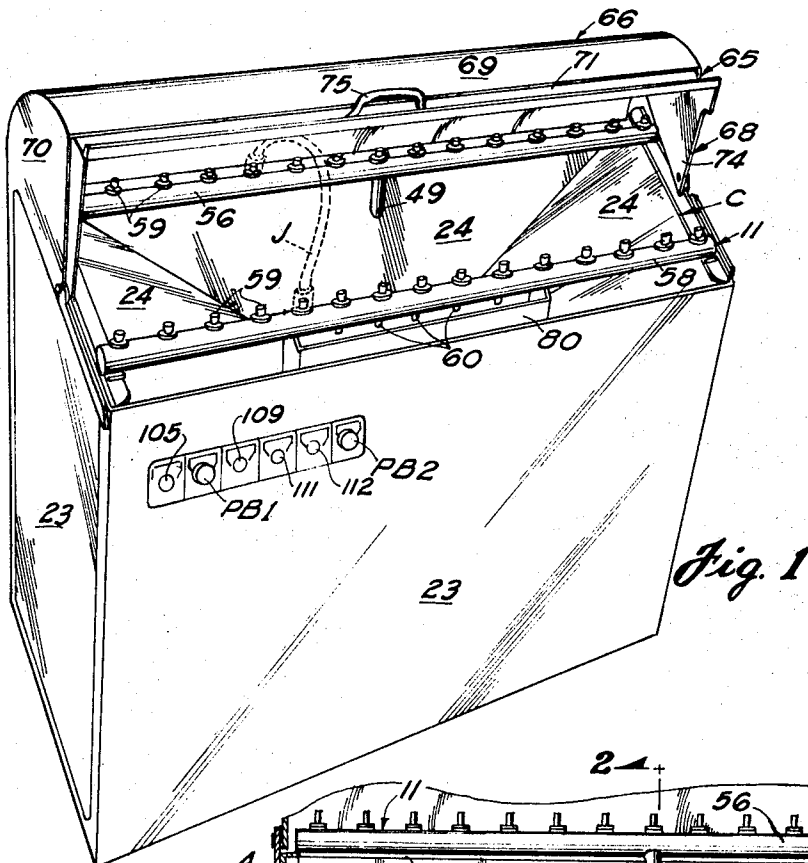


Fig. 1

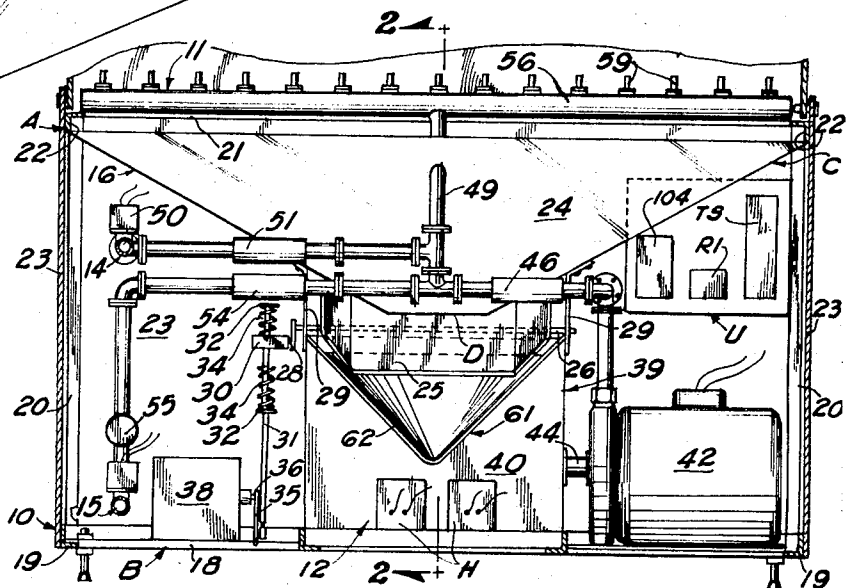


Fig. 3

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3 Sheets-Sheet 2

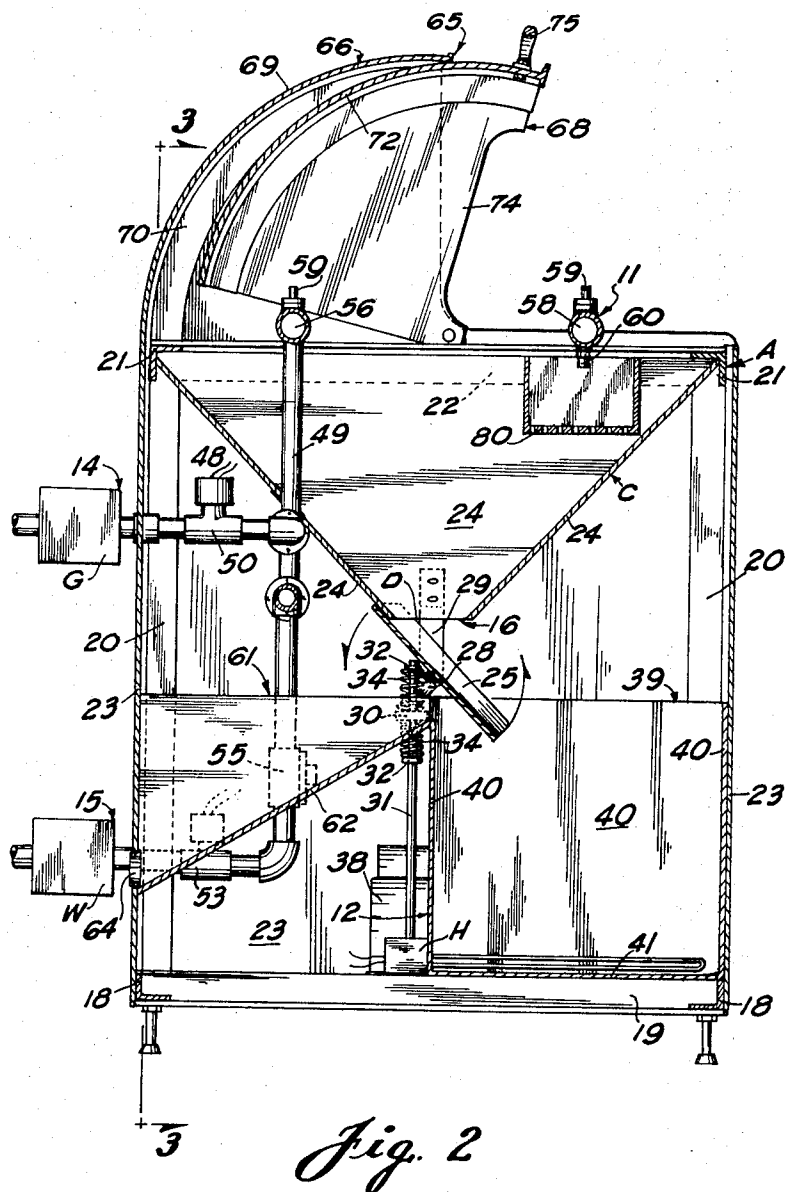


Fig. 2

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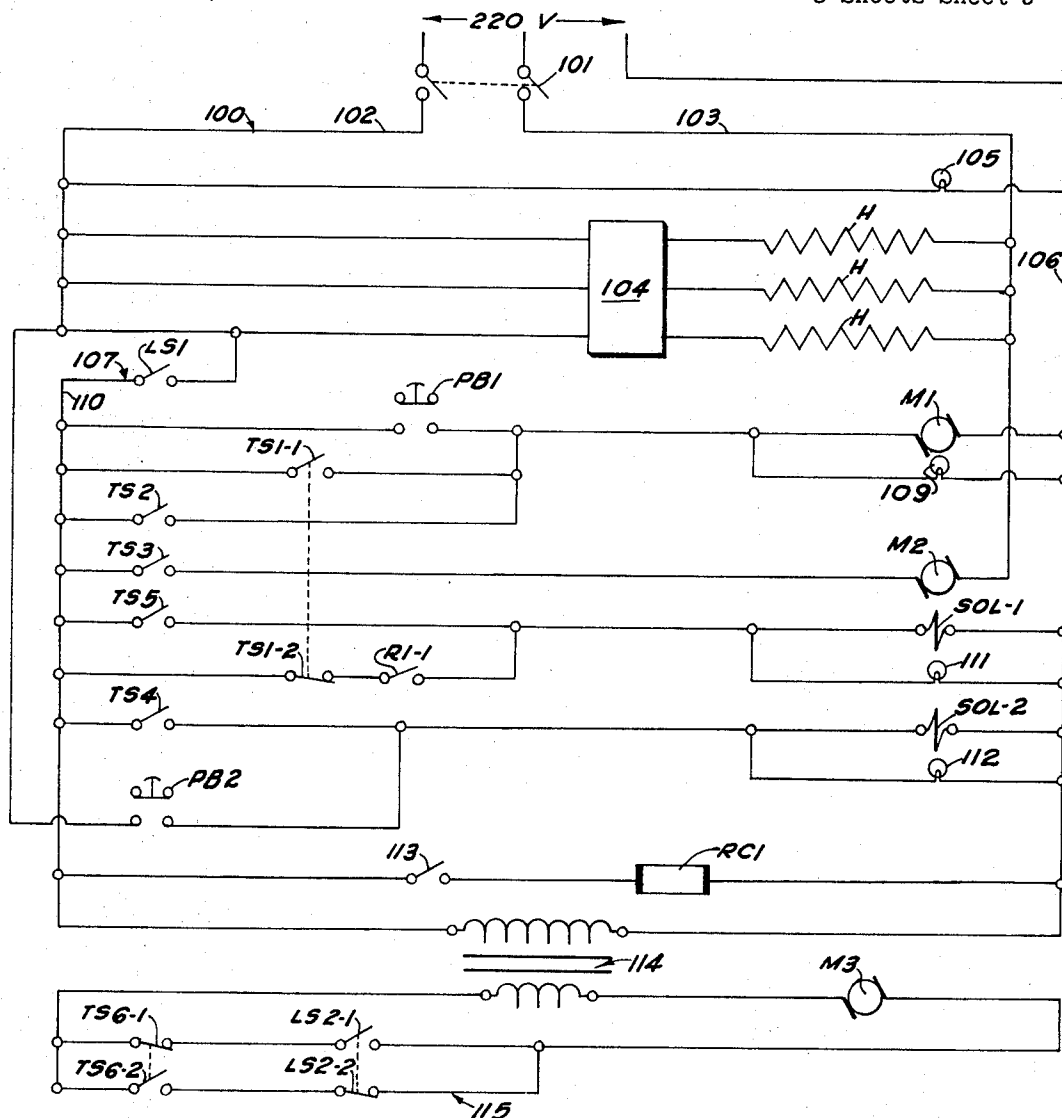


Fig. 4

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7 Claims

ABSTRACT OF THE DISCLOSURE

Method of and apparatus for cleaning residue from tubing used in liquid dispensing systems. The tubing is cleaned by passing a cleaning solution through the tubing, subsequently rinsing the tubing and filling the tubing with a non-contaminating fluid to maintain the tubing in a cleaned condition. A manifold mounts the tubing, and a cleaning solution supply mechanism connected to the manifold selectively forces a cleaning solution through the tubing. A rinse solution supply mechanism connected to the manifold rinses the tubing by selectively forcing water therethrough, and a gas supply mechanism selectively fills the tubing with a non-contaminating gas to maintain the tubing in cleaned condition.

This invention relates generally to a method of and apparatus for cleaning tubing used in the food industry, and is more particularly related to the cleaning of tubing used in dispensers for carbonated drink mixtures.

The lengths of tubing normally used in carbonated drink dispensing systems, such as those normally found at soda fountains, restaurants and the like, are generally referred to as jumpers. It has been found that a residue of syrup and other ingredients of the drink mixture adhere to the inside of the jumpers after extended periods of use and, if allowed to remain in the jumpers, will produce a yeast formation commonly called "mother." Therefore, it is necessary that this tubing be cleaned of the yeast residue periodically in order that the tubing may continue to be used without contaminating the carbonated drink mixtures passing therethrough.

The invention disclosed herein is directed at overcoming this problem by providing a method and apparatus effective to clean the yeast formation from the tubing and maintain it in a cleaned condition for reuse in a dispensing system. This allows the tubing to be reused without having to be discarded, thereby reducing the cost of maintenance of the dispensing system.

The apparatus of the invention comprises generally a manifold assembly which mounts the tubing thereon and means which is effective to pass a cleaning solution through the tubing thereby cleaning it, to pass a rinse solution through the tubing subsequent to the passage of the cleaning solution to remove the cleaning solution from the tubing, and subsequently to fill the tubing with a fluid to maintain the tubing in a cleaned condition until subsequent use.

These and other features and advantages of the invention will be more clearly understood upon consideration of the following specification and accompanying drawings wherein like characters of the reference designate corresponding parts throughout, and in which:

FIG. 1 is a perspective view of the apparatus with the hood raised;

FIG. 2 is a transverse cross-sectional view taken along the line 2—2 in FIG. 1; and,

FIG. 3 is a longitudinal cross-sectional view taken along the line 3—3 in FIG. 2.

These figures and the following detailed description disclose one embodiment of the invention, however, the

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inventive concept is not limited thereto since it may be embodied in other forms.

Referring more particularly to the drawings, it will be seen that the invention comprises generally a frame 10 carrying a manifold assembly 11 for mounting the tubing or jumpers J thereon, a caustic solution supply assembly 12, a gas supply assembly 14, a water supply assembly 15, and a discharge assembly 16. The supply assemblies 12, 14 and 15 are selectively connected to the manifold assembly 11 by a control unit U, and the discharge assembly 16 is effective to selectively discharge solution from the manifold assembly 11 into the caustic solution supply assembly 12 or out of the invention.

The frame 10 comprises generally a pair of spaced parallel angle members 18 joined at their ends by a pair of angle members 19 to form a rectangular shaped base B. A standard 20 extends vertically upward from each corner of the base B and carries at the upper ends thereof a support assembly A comprising a pair of spaced parallel side members 21 joined by end members 22 to form a rectangular shape similar to and positioned directly above the base B. Side panels 23 cover the sides of the frame 10.

The discharge assembly 16 comprises a collecting assembly C having the general shape of an inverted pyramid defined by side walls 24, the upper ends of which are carried by the support assembly A. The lower end of the collecting assembly C is open to form a discharge opening D through which fluid collected in the assembly C can be discharged. Pivotaly mounted along the longitudinal center line of the discharge opening D is a discharge damper 25 having a generally U-shaped configuration and positioned so that it directs the fluid discharged through the opening D either to the right or left as seen in FIG. 2 depending upon the direction in which the damper 25 is pivoted.

The damper 25 is mounted on pivot rod 26 having an arm 28 fixedly attached thereto at one end thereof which is effective to pivot the rod 26 as the arm 28 is rotated. The rod 26 is pivotally carried in a pair of mounting brackets 29 extending downwardly from the side walls 24 of the collecting assembly C. The arm 28 pivotally carries at its extending end a bearing block 30 slidably receiving a push rod 31 therethrough. The push rod 31 has stops 32, 32' positioned above and below the bearing block 30 and carries a spring 34 between each stop 32 and the bearing block 30 which is effective to resiliently urge the bearing block 30 either counterclockwise or clockwise, as seen in FIG. 2, depending on the direction in which the push rod 31 is moved.

The push rod 31 is pivotally mounted at its lower end on an extension arm 35 carried on the end of the shaft 36 of a selectively positionable motor control unit 38 which is effective to move the extension arm 35 a predetermined amount when the unit 38 is appropriately activated.

A catch basin 61 defined by side walls 62 is positioned oppositely to the caustic solution supply assembly 12 and is effective when the damper 25 is rotated clockwise, as seen in FIG. 2, to catch the fluid discharged through the opening D in the collection assembly C. The catch basin 61 is connected to an appropriate discharge pipe 64 so that the fluid discharged therein over the damper 25 will be discharged through the pipe 64 to an appropriate receptacle (not shown).

The caustic solution supply assembly 12 comprises generally a solution supply tank 39 having a generally rectangular shape defined by side walls 40 and a bottom wall 41, the top of the tank 39 being open. The rear side wall 40 is shorter than the other side walls 40 and is joined at its upper edge with a side wall 62 of the catch basin 61. This provides an overflow from the tank 39 into

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the catch basin 61 to prevent inadvertent overfilling of the supply tank 39. The tank 39 is positioned with respect to the damper 25 so that when it is rotated counterclockwise, as seen in FIG. 2, the fluid caught in the collection assembly C will be directed through the discharge opening D and into the tank 39 by the damper 25.

A pump and motor assembly 42 has its inlet 44 connected to the tank 39 and has its discharge connected to a manifold supply pipe 49 through a check valve 46. Therefore, it can be seen that when the pump and motor assembly 42 is activated, fluid will be supplied from the tank 39 through the check valve 46 to the manifold assembly 11.

The gas supply assembly 14 comprises an inlet pipe 48 connected to a pressurized gas source G which in turn is connected to the manifold supply pipe 49 through a solenoid valve 50 and a check valve 51. It will thus be seen that when the solenoid valve 50 is energized, gas from the gas source G will be directed to the manifold assembly 11 through the pipe 49.

The water supply assembly 15 comprises an inlet pipe 52 connected to a pressurized water source W which is in turn connected to the manifold supply pipe 49 through a solenoid valve 53, a pressure regulator 55, and a check valve 54. When the solenoid valve 53 is activated, water will be supplied to the manifold assembly 11 through the pipe 49, the regulator 55 and the check valve 54.

The check valves 46, 51 and 54 are connected to the assemblies 12, 14 and 15 so that fluid may be forced into the supply pipe 49 through the particular check valve 46, 51 and 54 associated with the particular assembly without the fluid entering the other assemblies. Therefore, it will be seen that the check valves 46, 51 and 54 connect each of the assemblies 12, 14 and 15 to the pipe 49 in parallel with each other.

The manifold assembly 11 comprises a pair of spaced substantially parallel manifold pipes 56 and 58 extending between the end members 22 and supported thereby. The manifold supply pipe 49 communicates with the manifold pipe 56 and a plurality of connectors 59, for mounting the jumpers J, are carried on the upper side of the manifold pipe 56 and communicate with the pipe 49. Although it is understood that the connectors 59 will be slightly different for different types of jumpers J, one such connector in common use is that manufactured by the Hansen Manufacturing Company of Cleveland, Ohio. With the "Hansen" connector, a check valve is provided in the connector 59 and in each end of the jumper J. The check valves in both the end of the jumper J and the connector 59 are automatically opened when the jumper J is attached to the connector 59 and are automatically closed when they are separated. It will be seen, then, that when the caustic solution or gas or water is supplied to the supply pipe 49, this fluid will be directed outwardly therefrom through the connectors 59 on the pipe 56.

The manifold pipe 58 also is provided with a plurality of connectors 59 communicating with the interior thereof. A plurality of discharge apertures 60 also communicate with the interior of the manifold pipe 58 and are effective to discharge fluid received into the pipe 58 through the connectors 59. The fluid received therein through the pipe 56 will be discharged from the pipe 58 through the apertures 60 into the collection assembly C.

Referring more particularly to FIG. 2, it will be seen that a perforated wash pan 80 is positioned within the collection assembly C just under the discharge apertures 60 of the manifold pipe 58 so that the jumpers J may be placed therein during the washing cycle prior to that washing cycle in which they will be placed on the connectors 59. This is effective to position the jumpers so that the solution discharged through the aperture 60 will fall upon the jumpers J and clean the outside thereof. Therefore, when the jumpers J have been positioned on the connectors 59 and cleaned internally, the outside thereof will already have been cleaned to eliminate the danger

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of inadvertently contaminating the inside of the jumper J upon subsequent handling thereof.

A cover assembly 65 is carried by the support assembly A and comprises a fixed portion 66 and a pivotal portion 68. The fixed portion 66 comprises an arcuate member 69 closed at its ends by end plates 70 having the same arcuate configurations at their outer periphery as the member 69. The arcuate member 69 has the same length as the side members 21 and the end members 70 are equal to approximately one-half the length of the end members 22.

The movable portion 68 comprises generally an arcuate shaped member 72 joined by end members 74 and is of the same general configuration as the fixed portion 66. One end of each of the end members 74 is pivotally carried by one of the end members 22 and a handle 75 is provided at the opposite side thereof so that the movable portion 68 may be pivoted within the fixed portion 66.

A normally open limit switch LS1 is positioned adjacent one of the outer edges of the movable portion 68 and is closed by the portion 68 when it is closed. The switch LS1 serves as a safety switch to prevent this inadvertent activation of the operation of the invention while the movable portion 68 is raised.

A control unit U is provided for selectively controlling the pump and motor assembly 42 and the solenoid valves 50 and 53 to render the washing cycle completely automatic. The control unit U is provided with a starter switch PB1 and a separate push button switch PB2 is provided for manually activating the solenoid valve 50 independently of the control unit U.

Heaters H are provided in the tank 39 for maintaining the caustic solution at a predetermined temperature for optimum cleaning. The heaters H are also controlled by the control unit U and are positioned below the inlet 44 in the tank 39 so that the heating elements of the heaters H will not be inadvertently exposed to the atmosphere to cause the heaters H to destroy themselves.

ELECTRICAL CIRCUIT

Referring to FIG. 4, the control unit U is shown in more detail. It will be seen that the control circuit 100 of the control unit U is connected to a conventional 220 volt source through a master switch 101. The heaters H are connected in parallel with each other to the 220 volt source through the wires 102 and 103. A thermostatic controller 104 selectively controls the heaters H so that the heaters H are activated in a progressive manner as more heat is needed in the caustic solution tank 39 and each heater H is regressively turned off as less heat is needed in the caustic solution tank 39. A glow light 105 is connected to the wires 102 and the common ground wire 106 so that 110 volts are imposed thereacross to illuminate the glow light 105 when the master switch 101 is closed.

The automatic control portion 107 of the control circuit 100 is selectively connected to the wire 102 through a normally open limit switch LS1 and the wire 110. The parallel circuit of the timer motor M1 of the timer switch TS and the glow light 109 are connected to the wire 110 and the wire 106 in series with the parallel circuit formed by the start switch PB1, the normally open contacts TS1-1 of the timer switch TS and the normally open contacts TS2 of the timer switch TS. The caustic pump motor M2 of the assembly 42 is connected to the wires 110 and 103 through the normally open contacts TS3 of the timer switch TS.

The solenoid SOL-1 of the solenoid valve 53 is in parallel with the glow light 111 and is connected between the wire 110 and the wire 106 in series with the parallel circuit of the normally open contacts TS5 of the timer switch TS and the normally closed contacts TS1-2 of the timer switch TS in series with the normally closed contacts R1-1 of a relay R1.

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The solenoid SOL-2 of the solenoid valve 50 in parallel with the glow light 112 is connected between the wires 110 and 106 in series with normally open contacts TS4 of the timer switch TS. The solenoid SOL-2 and the glow light 112 are also connected to the wire 102 in parallel with the wire 110 through the push button switch PB2.

The relay coil RC1 of the relay R1 is connected between the wires 106 and 110 in series with the normally open contacts 113 of the fluid level control FLC. Therefore, it will be seen that the relay R1 is activated when the level of the liquid in the tank 39 drops below a certain level.

One side of a power transformer 114 is connected between the wires 110 and 106 so that 110 volts are imposed thereacross. The other side of the power transformer 114 is connected to the damper motor M3 of the control unit 33 in series with the parallel circuit 115 having one branch formed by the normally closed contacts TS6-1 of the timer switch TS in series with the contacts LS2-1 of the limit switch LS2 and the other branch being formed by the normally open contacts TS6-2 of the timer switch TS in series with the contacts LS2-2 of the limit switch LS2. It is to be understood that the damper motor M3 and the limit switch LS2 are housed within the damper motor control unit 38.

OPERATION

In operation it will be seen that the master switch 101 is first closed. This starts operation of the heaters H through the controller 104 to heat the caustic solution to a predetermined temperature as set in the thermostatic controller 104 and the solution will be maintained at this temperature during the washing of jumpers J.

A plurality of jumpers J are then fitted onto the connectors 59 on the manifold pipes 56 and 58 so that the check valves in each will be opened for the passage of fluid therethrough from the pipe 56 to the pipe 58. Another plurality of jumpers J are placed in the perforated wash pan 80 for cleaning the outside thereof during the wash cycle. The movable portion 68 is then closed thereby closing the switch LS1 and the push button switch PB1 is then depressed to start the automatic operation of the invention.

Depression of the switch PB1 starts the motor M1 of the timer switch TS to selectively close contacts TS1 through TS6 for the washing of the jumpers J. The motor M1 first closes the contacts TS2 to maintain operation of the motor M1 while the caustic solution level is automatically checked and replenished as necessary.

The caustic solution level is checked through the relay R1 which has its coil RC1 activated by closure of the switch 113 when the level of the caustic solution is below a predetermined level. This is effective to close contacts R1-1 and activate solenoid SOL-1 through normally closed contacts TS1-2. This opens the valve 53 and directs water through the manifold assembly 11, the jumpers J and the collection assembly C into the caustic solution tank 39 over the damper 25 until the switch 113 is opened. Therefore, it will be seen that the caustic solution level is checked and replenished if necessary before each washing cycle. After enough time has elapsed for the solution to be checked and replenished, the contacts TS1-2 are opened and the contacts TS1-1 are closed to stop the caustic solution checking operation.

Contacts TS3 are then closed to activate the motor M3 of the assembly 42 and pump the caustic solution from the tank 39 up through the manifold assembly 11 and the jumpers J positioned on the connectors 59. As the solution is discharged from the manifold pipe 58, the solution falls on the jumpers J in the perforated wash pan 80 thereby cleaning them and then drains into the collection assembly C. The solution is then directed into the caustic solution tank 39 by the damper 25.

The length of time that the caustic solution is pumped through the jumpers J may be varied as needed by adjust-

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ing the timer switch TS. Although this time may have to be varied to clean different types of jumpers J, it has been found that eleven minutes of operation is sufficient for cleaning the type of jumpers J disclosed herein.

The contacts TS3 are then opened to stop the motor M2 and the contacts TS4 are closed to activate the solenoid SOL-2 to direct the gas through the manifold assembly 11 and the jumpers J. This is effective to purge the caustic solution from the jumpers J for drainage into the tank 39. Although the length of time that the jumpers J are purged may need to be varied for different jumpers J by adjusting the timer switch TS, it has been found that a period of thirty seconds of purging is sufficient for the type of jumpers J disclosed herein.

After allowing a short period of time for the caustic solution to drain, the contacts TS4 are opened and the contacts TS5 and TS6-2 are closed while the contacts TS6-1 are opened. Since the contacts LS2-2 are closed when the damper 25 is in the position shown in FIG. 2, the damper motor M3 is activated to transfer the damper 25 counterclockwise as seen in FIG. 2 to the position shown in FIG. 3 whereupon the contacts LS2-2 are opened and the contacts LS2-1 are closed to stop the motor M3.

The closing of contacts TS5 activates solenoid SOL-1 to open the solenoid valve 53 to direct water under pressure through the jumpers J to completely rinse the caustic solution from the interior thereof. The water is discharged from the manifold pipe 58 over the jumpers J in the wash pan 80 to rinse the caustic solution from the outside thereof and subsequently into the catch basin 61 by the collection assembly C and damper 25.

Although the length of time necessary for the water to completely rinse the jumpers J may vary with different jumpers J by adjusting the timer switch TS, it has been found that a rinse time of one and one-half minutes is sufficient for the type of jumpers J disclosed. At this time, the solenoid valve 53 is deactivated by opening contacts TS5 and the solenoid valve 50 is energized by again closing contacts TS4 to purge the water from the jumpers J for approximately thirty seconds.

After allowing a short period of time for the water to drain the contacts TS6-1 are closed to rotate the damper 25 back to its position as shown in FIG. 2 whereupon the contacts LS2-1 are opened and the contacts LS2-2 are closed to stop rotation of the motor M3. The automatic operation of the machine is now complete and contacts TS1-1 and TS2 are opened to stop the timer switch TS.

The operator lifts the movable portion 68 of the cover assembly 65 and removes the ends of the jumpers J connected to the connectors 59 on the manifold pipe 58 and depresses the push button switch PB2 to refill the jumpers with carbon dioxide to prevent recontamination. Then that end of each of the jumpers J connected to the connectors 59 on the manifold pipe 56 is removed and the ends wrapped for shipment so as to keep them in a non-contaminated condition. The machine is now ready for a subsequent washing cycle by attaching the jumpers J within the wash pan 80 to the connectors 59 and depressing switch PB1.

Although particular embodiments of the invention have been disclosed herein, it is to be understood that the full use of modifications, substitutions and equivalents may be resorted to without departing from the scope thereof as defined by the appended claims.

I claim:

1. A method of cleaning tubing for fluid dispensing systems comprising the steps of:

- passing a cleaning solution under pressure through said tubing for a sufficient amount of time to clean contaminates from said tubing;
- rinsing said cleaning solution from said tubing;
- filling said tubing with a non-contaminating fluid under pressure; and
- sealing the ends of said tubing while said non-contaminating fluid is contained therein under pressure.

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2. A method of cleaning tubing for fluid dispensing systems as set forth in claim 1 wherein said non-contaminating fluid is carbon dioxide gas.

3. The method of claim 1 further including the steps of washing the outside of the tubing with a cleaning solution and subsequently rinsing the cleaning solution from the outside of the tubing.

4. A method of cleaning tubing for fluid dispensing systems as set forth in claim 1 wherein said cleaning solution is passed through said tubing for approximately eleven minutes.

5. A method of cleaning tubing for fluid dispensing systems as set forth in claim 1 wherein said cleaning solution is discharged from said tubing by a non-contaminating fluid before said tubing is rinsed.

6. A method of cleaning tubing for fluid dispensing systems as set forth in claim 5 wherein said rinsing medium

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is discharged from said tubing by a non-contaminating fluid before said tubing is filled with a non-contaminating fluid.

7. A method of cleaning tubing for fluid dispensing systems as set forth in claim 6 wherein said tubing is rinsed with water for approximately one and one-half minutes.

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