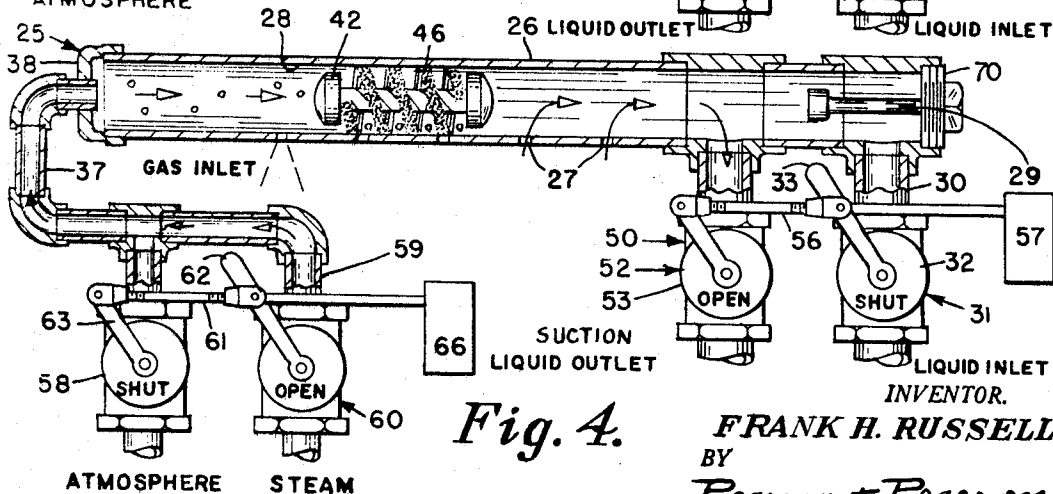
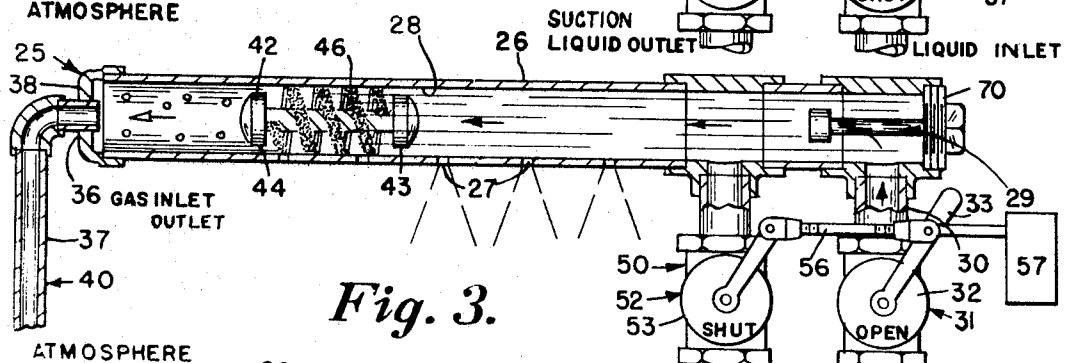
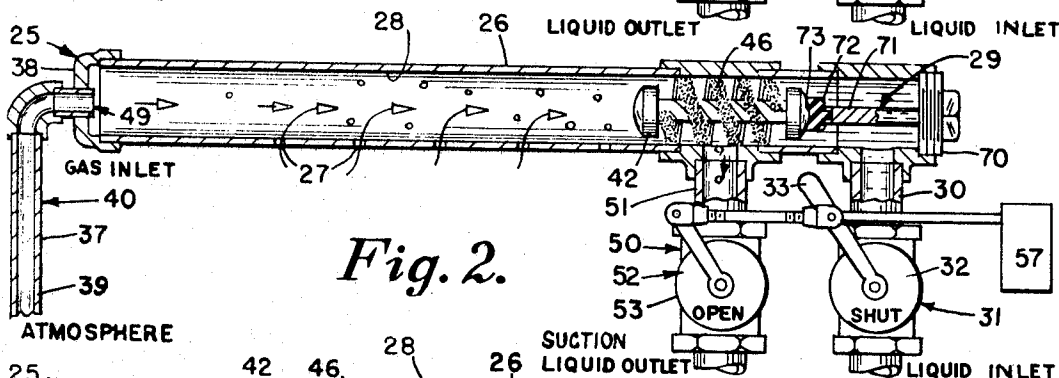
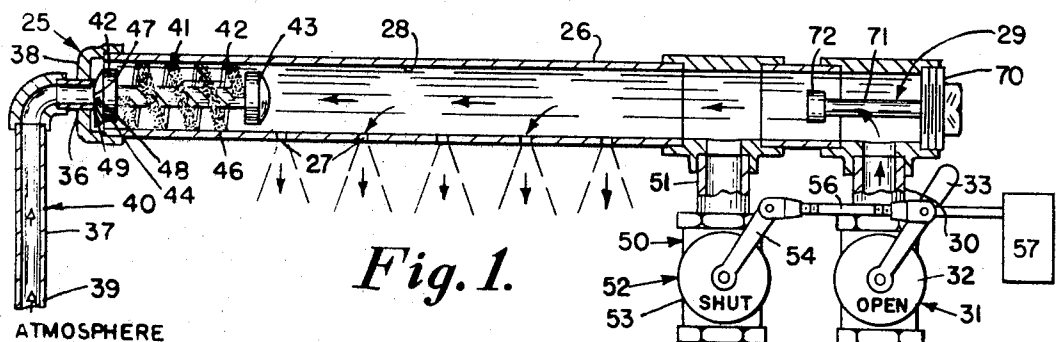


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METHOD FOR CLEANING THE ORIFICES OF SHOWER TUBES BY
APPLYING SUCTION AND BRUSHING
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METHOD FOR CLEANING THE ORIFICES OF SHOWER TUBES BY APPLYING SUCTION AND BRUSHING

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U.S. Cl. 162-272

2 Claims

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ABSTRACT OF THE DISCLOSURE

A method for cleaning the orifices of shower tubes, of the type used in the paper art, including the steps of closing off the liquid inlet, opening the liquid outlet and applying a source of suction to one end of the tube to extract the contents by back flow and simultaneously brushing sediment from the inside faces of the shower orifices, so that sediment lodged in the orifices is sucked inwardly into the tube rather than forced outwardly into more firm contact within the orifice.

This invention relates to shower assemblies of the type used in the manufacture of paper or the like and especially to small orifice showers through which sedimented liquid, such as "white water," must be passed.

This application is a division of my application Ser. No. 252,160 filed Jan. 17, 1963 now Patent No. 3,228,611 of Jan. 11, 1966.

The sediment in white water tends to clog the orifices of paper mill showers and it has heretofore been proposed to provide manually reciprocable discs or brushes within the spray tube for periodically cleaning the inner faces of the shower nozzles, or orifices. It has also been proposed to provide a freely slidable cleaning plug, usually with flexible brush bristles, within a spray tube, the plug being movable longitudinally in one direction by the spray liquid pressure and in the opposite direction by a by-pass from the liquid pressure source. It has also been proposed to substitute hot water, or steam for the spray liquid thereby attempting to blow sediment out through the spray orifices and to melt wax-like sediment.

Thus the prior art teaches the removal of orifice sediment by brushing or melting and then flushing the sediment by liquid pressure into a waste pipe but the system has had the disadvantage that the brushing and liquid flushing operation has not dislodged sediment located near the outside of the orifices. Often the orifices in the shower tube, or in the nozzles in the tube are relatively deep and tapered so that outward pressure lodges the sediment more firmly in the orifice and brushing the inner faces from within the tube has little or no effect in cleaning the apertures.

In British Patent 911,269 of Nov. 21, 1962 to Skardal entitled, Method and Means for the Cleansing of Spray Tubes, it is proposed to apply suction and discharge liquid from the far end of a shower tube, opposite from a liquid inlet end. While such a system does not have the disadvantage of back flowing additional white water through the tube it does have the disadvantage that the white water in the tube is flowed forwardly out of the tube. Thus if fibres have stapled at the orifices, they may not

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be dislodged by liquid continuing on in the same direction. In this invention the liquid outlet is at the same end of the tube as the liquid inlet and the white water already in the tube is back flowed to dislodge foreign material from the opposite direction without adding a new supply of foreign material. In addition, a sliding brush is used to further dislodge accumulations of material.

The principal object of this invention is to provide a shower assembly with orifice cleaning means which eliminates entirely the back flow of a new supply of shower liquid through the tube and makes use of atmospheric pressure for forcing orifice sediment back through the orifices and into the tube, in conjunction with back flow of liquid already in the tube, to flush out the dislodged sediment from the system.

Another object of the invention is to provide a method for cleaning a spray tube which includes the creation of subatmospheric pressure within the tube by power actuated suction, independent of the liquid source of the contents out of the inlet end of the tube whereby atmospheric pressure presses sediment inwardly to be drawn out of the inlet end of tube in the absence of outward liquid pressure.

A further object of the invention is to provide mechanical orifice cleaning means in the form of a freely slidable cleaning brush within a spray tube, the brush closing an air inlet and outlet opening at the far end of the tube under normal spray liquid pressure but being moved to the opposite liquid inlet end of the tube by atmospheric pressure when liquid pressure is shut off, along with sediment forced inwardly from the orifices into the tube by atmospheric pressure.

Still another object of the invention is to provide a spray tube with a slidable brush, the brush being vacuum cleaned after, and the sediment vacuum extracted from the tube while, back flushing the tube with liquid already in the tube.

A still further object of the invention is to provide a self cleaning shower assembly for intermittently shutting off the liquid supply inlet, creating a vacuum within the tube to slide a cleaning plug therealong, force sediment in the orifices into the tube and draw the sediment into a conduit leading from the inlet end of the tube and, if desired, to apply hot water, or steam, pressure behind the plug to melt any wax-like sediment in the tube or orifices.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawing and from the drawing in which:

FIG. 1 is a somewhat diagrammatic front elevational view, partly in half section showing the shower assembly of the invention in normal spray condition.

FIG. 2 is a view similar to FIG. 1 showing the vacuum cleaning step when the liquid supply is shut off.

FIG. 3 is a view similar to FIG. 1 showing the liquid supply again opened to seal the outlet, and

FIG. 4 is a view similar to FIG. 1 showing the vacuum cleaning step being accompanied by a hot water or steam back flushing operation.

As shown in FIG. 1 the paper stock shower assembly 25 of the invention includes the shower tube 26, the tube 26 having a plurality of longitudinally spaced spray orifices such as 27 which may be flat disc type nozzle inserts or of any other suitable design wherein the inside face 28 of the shower tube is smooth and of uniform cross section.

The inlet end 29 of shower tube 26 is closed and connected to a source of spray liquid, not shown, by the pipe 30. In the paper art the liquid is usually white water containing fibres and other paper stock material which tend to clog the orifices 27. First valve means 31 is provided proximate the inlet end 29 of tube 26 for controlling the flow of spray liquid. As shown, first valve means 31 includes the liquid inlet valve 32, of the gate or any other suitable type, mounted in the supply pipe 30 and having an operating lever 33 for opening and closing the valve.

Unlike the conventional shower tube of the prior art, the opposite other end 36 of shower tube 26 is open, there being a conduit 37 preferably mounted in an end cap 38 and leading into an atmospheric environment at the terminal end 39. While the conduit 37 constitutes means 40 for connecting the other end of the tube to an atmospheric pressure environment, it will be apparent that the assembly would function equally well if there were no conduit and the cap 38 merely served as a valve port.

Second valve means 41 is provided in the form of the cleaning plug 42 which is freely slidable longitudinally within the shower tube 26 from its storage position, at the other end 36 shown in FIG. 1 to the inlet end 29 as shown in FIG. 2. The plug 42 constitutes mechanical orifice cleaning means which cooperates with the vacuum orifice cleaning means of the invention. Preferably the cleaning plug 42 includes buffer heads 43 and 44, each at an opposite end thereof and each spaced about $\frac{1}{16}$ inch from the inside face 28 of tube 26 and a helical brush 46 extending between the buffer heads and closely fitting the inside face 28 to serve as a piston head adapted to rotate the plug while cleaning the orifices 27. The outer side of the buffer head 43 is shaped as a valve 47 to engage a valve seat 48, formed by the inner end of conduit 37, to constitute means 49 for sealing the other end 36 of shower tube 26 when the tube is under liquid pressure.

The fluid extraction means 50 includes the conduit 51 connected to the interior of shower tube 26, between the inlet end 29 and other end 36 and preferably close to the liquid supply pipe 30. Conduit 51 leads to a source of sub-atmospheric pressure not shown, such as mill vacuum, a suitable power actuated vacuum tank and pump or other vacuum source, independent of the source of shower liquid, to thereby remove all extracted sediment from the system. Third valve means 52 is mounted in conduit 51, preferably in the form of a gate, or other type, valve 53 having an operating lever 54 for opening and closing the valve to control the suction in the conduit.

Linkage 56 connects the operating levers 33 and 54 whereby one valve is closed when the other valve is open and timing means 57, which may be of any well known type, is shown diagrammatically to indicate that operation may be manual or automatic as desired.

The threaded end cap 70 preferably includes an axially extending tube, or rod, 71 having a rubber bumper 72 at the terminal end, there being a recess 73 for receiving and cushioning the buffer 43 while halting and positioning plug 42 opposite conduit 51.

The cleaning plug 42 is of predetermined length such that it can be stored in the other end 36 without blocking any of the orifices 27 and such that when moved to the inlet end 29 by atmospheric pressure through the conduit 37, it will be halted with the brush 46 directly opposite the suction conduit 51. Thus upon shutting off valve 32 and opening valve 53, a subatmospheric pressure is created within tube 26, atmospheric pressure forces any sediment clogging the orifices 27 into the tube 26 and atmospheric pressure pushes cleaning plug 42 along the line of orifices, while rotating the brush to not only clean the orifices but to push the sediment in the direction of the outlet suction conduit 51. At its terminal position the sediment is vacuum cleaned from the brush and from the space between the buffer heads. Upon opening valve 32 and closing valve 53 the spray liquid pressure moves the plug 42 back to its storage position sealing the other end

and the plug tends to discharge any sediment on the far side of the plug into the conduit 37.

In the preferred embodiment of my invention, a manual shut-off valve 58 is mounted in conduit 37, a second fluid conduit 59 is connected into conduit 37 above valve 58 leading to a source of hot fluid such as steam, not shown, and a fourth valve means 60 is mounted in conduit 59 for controlling the flow thereof. Linkage 61 connects the operating levers 62 and 63 of the valve 58 and the valve 64 of fourth valve means 60 for joint operation and a timing means 66 similar to means 57 may also be provided if desired. It will thus be seen that the assembly 25 of not only suction cleaning of the orifices 27 inwardly into the tube but of pushing the plug 42 with super atmospheric pressure from its storage position toward the inlet end of the tube and following up the brushing action of the plug with the melting effect of hot steam.

In operation as shown in FIG. 1, the shower tube 26 is full, of the shower liquid being sprayed from the orifices 27, from the liquid inlet end 29 to beyond the plug 42 up to the valve port, or seat at the far, or other end 36 of the tube. It should be noted that end 36 is not the liquid outlet end of the tube and that the valve port, opening or seat 48 and the conduit 37 are both for the inlet or outlet of air, steam or the like. Upon closing liquid inlet valve 32 and opening liquid and air outlet valve 53, the power actuated suction in conduit 51 draws the shower liquid out of the tube, the liquid temporarily sealing the orifices 27 and permitting suction to build up to an amount sufficient to cause atmospheric pressure in port 48 to dislodge plug 42 and push the plug toward the liquid outlet conduit 51. Atmospheric pressure simultaneously forces any foreign material in the orifices 27 back into the tube to be brushed to the outlet 51 by the plug 42 along with the back flow of the shower liquid then in the tube.

Upon arrival at conduit 51 the plug 42 is vacuum cleaned by the suction in conduit 51. The closing of outlet valve 53 and opening of inlet valve 32, causes the liquid pressure of the forward flow of liquid to return the plug 42 to its storage position after again sweeping the orifices in its return travel.

I claim:

1. A method for showering liquid from and cleaning the spray orifices of a shower tube having a normally open liquid inlet and a normally closed liquid outlet at one end and a normally closed gas inlet at the other end, said method comprising the steps of:

providing a source of shower liquid and a source of suction, independent of said liquid source

then first closing said liquid inlet, opening said liquid outlet and applying said suction at said liquid outlet to create sub-atmospheric pressure within said tube for back flowing and partially extracting the liquid contents of said tube while liquid fills said orifices, then continuing to apply said suction and to back flow and extract the contents of said tube while atmospheric pressure forces liquid and sediment in said orifices inwardly into said tube and out of said liquid outlet;

simultaneously with said preceding step, automatically opening said gas inlet and automatically brushing the inner faces of said orifices from said gas inlet end to said liquid inlet end while the contents of said tube are being back flowed and extracted from said tube;

and then closing said liquid outlet, ceasing to apply said suction and opening said liquid inlet to restore normal showering of said tube.

2. A method for showering liquid from, and cleaning the spray orifices of, a shower tube having a normally open liquid inlet and a normally closed liquid outlet at one end and a normally closed gas inlet at the other end, said method comprising:

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the steps of providing an independent source of suction, then first closing said liquid inlet, opening said liquid outlet and applying said suction at said liquid outlet to create sub-atmospheric pressure within said tube for back flowing and partially extracting the liquid contents of said tube while liquid fills said orifices; then continuing to apply said suction and to back flow and extract the contents of said tube while atmospheric pressure forces liquid and sediment in said orifices inwardly into said tube and out of said liquid outlet; automatically brushing the inner faces of said orifices from within said tube, after said atmospheric pressure has forced sediment in said orifices inwardly

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and while the contents of said tube are being back flowed and extracted out of said tube; and then closing said liquid outlet, ceasing to apply said suction and opening said liquid inlet to restore normal showering of said tube.

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U.S. Cl. X.R.

134—8, 21, 22; 239—116