

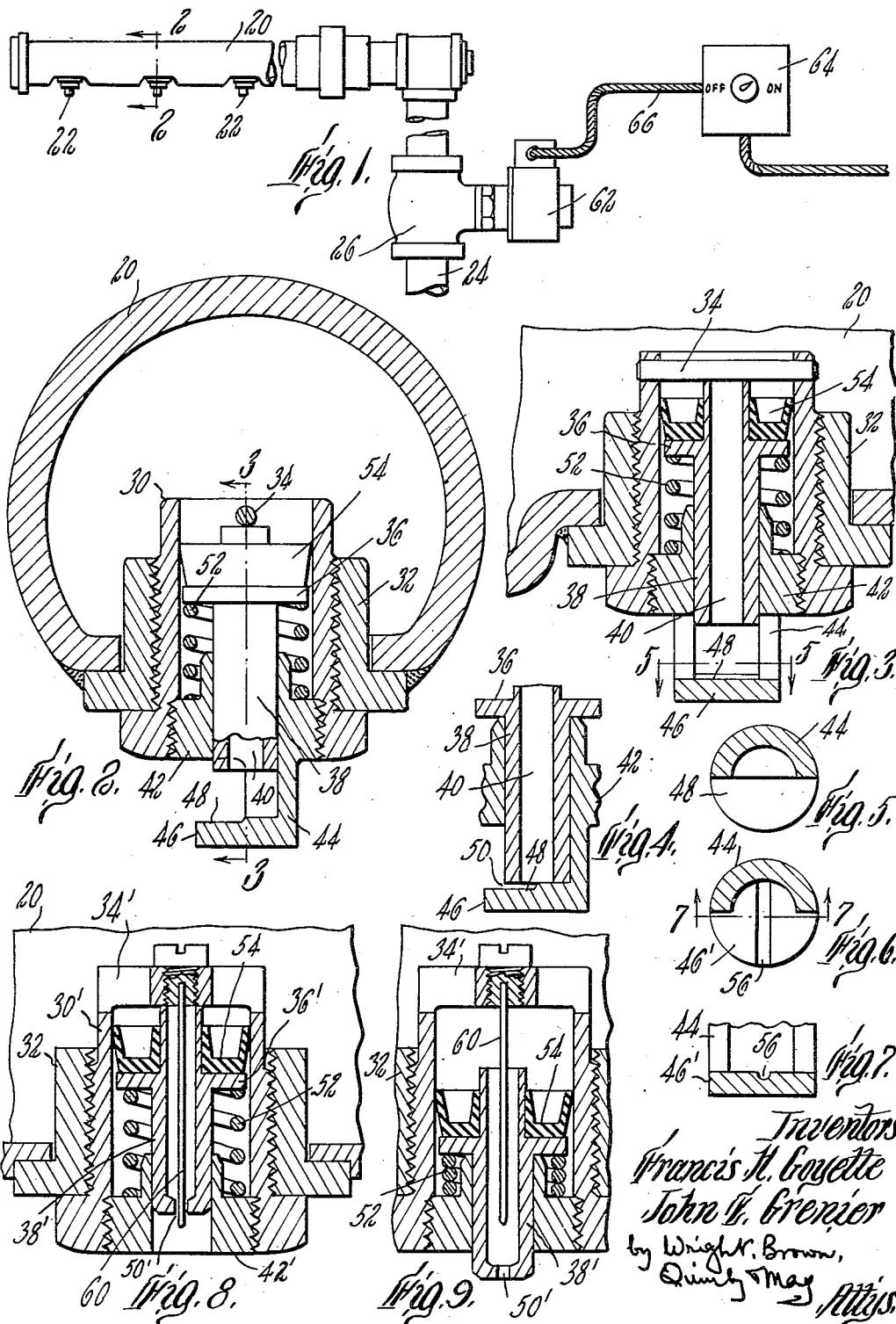
Aug. 20, 1957

F. H. GOYETTE ET AL

2,803,499

SPRAY NOZZLE AND METHOD OF CLEANING SAME

Filed Aug. 19, 1955



Inventors
 Francis H. Goyette
 John E. Brenner
 by Wright, Brown,
 Quincy May, Attys.

1

2,803,499

SPRAY NOZZLE AND METHOD OF CLEANING SAME

Francis H. Goyette, Worcester, and John E. Grenier, Leicester, Mass., assignors to Lodding Engineering Corporation, Worcester, Mass., a corporation of Massachusetts

Application August 19, 1955, Serial No. 529,464

3 Claims. (Cl. 299—59)

This invention relates to a spray nozzle and for a method of cleaning the nozzle in case it tends to become plugged with sediment or other matter entrained in the stream of water flowing therethrough. The nozzle is available for use wherever a spray is desired. In the present instance it is primarily intended for use on shower pipes of paper-making machines, such pipes being arranged to supply water for spraying various parts at the wet end of the machine. Water supplied to such pipes is apt to carry fibrous and other matter which is capable of partially or wholly clogging a nozzle by accumulating therein. An object of the invention is to provide a spray nozzle that can be quickly cleaned of any clogging material without more than a momentary interruption of the spray. According to one embodiment of the invention, the nozzle is made with a relatively large discharge opening which is partially blocked during ordinary operation by a fixed member which is effective only so long as pressure is maintained in the shower pipe. Hence, to clear the nozzle, the water supply to the shower pipe is momentarily reduced or shut off, whereup the discharge opening is unblocked, providing a ready escape for any material which may have been clogging the nozzle. When the water supply to the shower pipe is resumed, the initial flow through the large discharge opening sweeps out any solid matter which may be there, and the water pressure building up in the shower pipe causes the discharge opening to be partially blocked or constricted to the size and shape suitable for the emission of a spray.

For a more complete understanding of the invention, reference may be had to the following description thereof, and to the drawing, of which—

Figure 1 is an elevational view of a shower pipe having a series of spray nozzles embodying the invention, and a shut-off valve in the pipe with an automatic control device for shutting the valve briefly at predetermined intervals;

Figure 2 is an enlarged section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a fragmentary sectional view of a portion of the structure shown in Figure 2, the parts being in their spray-producing position;

Figure 5 is a section on the line 5—5 of Figure 3;

Figure 6 is a sectional view similar to Figure 5, but of a slightly modified form of the invention;

Figure 7 is a section on the line 7—7 of Figure 6;

Figure 8 is a sectional view of a modified form of spray nozzle; and

Figure 9 is similar to Figure 8 except that the movable parts are in different positions.

In a number of industrial operations, it is necessary to maintain a spray or sprays of liquid, usually water, for the satisfactory performance of the apparatus employed. For example, in a paper-making machine it is necessary to shower constantly certain parts of the apparatus to prevent the accumulation of fibers thereon which in time would result in imperfections in the paper produced by the machine. Spray jets are customarily produced by

2

nozzles having constricted orifices which are apt to be clogged by solid matter such as dirt or fibers entrained in the stream. It is an object of the invention to construct the nozzles in such a way as to be cleaned quickly and easily without being dismantled and with only momentary interruptions in their operation.

A typical shower pipe 20 is shown in Figure 1, this pipe being provided with a series of nozzles 22 and being supplied with water from a supply pipe 24 through a shutoff valve 26. As usually installed, the shower pipe 20 is horizontal as illustrated in Figure 1, the nozzle being mounted to project through the bottom of the pipe. As indicated in Figure 2, a nozzle structure embodying the invention may comprise a body which, as shown in Figure 2, may consist of three parts, namely, a flanged outer sleeve 32, a flanged inner sleeve 30, and a plug 42. The flange of the outer sleeve is welded or otherwise secured to the wall of the pipe 20; the inner sleeve 30 is screwed into the outer sleeve 32, and the plug 42 is screwed into the flanged end of the inner sleeve to close that end except for a central bore through the plug. The body of the nozzle is almost wholly within the pipe 20. This arrangement makes for economy of space which is often important. For example, in paper-making machines the room available for a spray pipe may be very limited. In such cases economy of space is necessary. Another advantage results from location of the inner orifice of the inner sleeve 30 well above the bottom of the space within the pipe. If heavy dirt enters the pipe 20 it will settle on the bottom of the pipe around the outer sleeve 32 and will not be drawn into the orifice of the inner sleeve 30. The accumulated heavy dirt in the pipe is easily flushed out periodically. The nozzle structure is hereinafter described as being in the upright position shown in Figures 2 and 3, but it is to be understood that such terms as "upper" and "lower" are used in the specification and claims as words of convenient description and not limitation. The upper end of the sleeve 30 has a large inlet aperture. As shown this upper end is entirely open except for a transverse pin 34 which is a stop to limit the upward movement of a piston 36 slidably mounted in the sleeve 30. The piston has a tubular piston rod 38 which extends downward therefrom and is coaxial therewith. The bore 40 of the rod 38 provides a passage through the piston 36 so that fluid can flow down from the upper end of the nozzle, past the piston, and out from the lower end of the rod. To produce a spray, a fixed bracket 44 is provided. This bracket may conveniently be integral with the member 42. The bracket has a horizontal shelf 46 beneath the tubular rod 38 for the purpose of partially blocking or constricting the discharge orifice at the lower end of the rod 38 when engaged by the core. The upper face of the shelf 46 is horizontal but a part of it is offset downward as at 48 to provide a spray-forming slit 50 between its face and the end edge of the tubular rod 38 when the latter is moved down into engagement with the shelf 46, as indicated in Figure 4.

The member 42 acts as a guide for the tubular rod 38 and also as a support for a spring 52 which is compressed between the member 42 and the lower face of the piston 36. The spring 52 constantly presses the piston upward and maintains the piston and its rod in the elevated position shown in Figures 2 and 3 unless opposed by a superior downward force. Such downward force is supplied by water pressure acting on a cup washer 54 which bears on the upper face of the piston and fits in the bore on the sleeve 30. The spring 52 employed in the device is sufficiently weak to be overcome by the downward force exerted on the piston by water in the pipe 20 at ordinary available working pressure. During operation of the spraying device, the tubular rod 38 is held against the

shelf 46 to produce spray through the spray-forming slit 50 between the lower end of the core 38 and the offset portion 48 of the face of the shelf 46, the spray being injected horizontally. If any nozzle in the line begins to be clogged by foreign matter carried in the stream flowing there-through, the operator can turn off the valve 26 momentarily. The drop in water pressure on the piston enables the spring 52 in each nozzle to lift the piston and its tubular rod, thus removing the constriction of the passage through the rod. When the valve 26 is opened again, the liquid rushes unimpeded through the passage 40 and flushes out any foreign matter which may have caught on the shelf 46. The building up of pressure in the pipe 20 moves the pistons 36 down against the springs 52 until the lower ends of the tubular rods bear on the respective shelves 46 and the formation of sprays is resumed.

The surface contour of the face of the shelf 46 may be varied in many ways according to the pattern of the spray desired. For example, as shown in Figures 6 and 7, the face of the shelf 46' may be plane except for a groove 56 through which liquid can be discharged when the rod 46 is held down against the shelf 46'. Thus the face of the shelf can be varied to produce any number of different spray patterns.

A modified form of the invention is shown in Figures 8 and 9. A sleeve 30' is screwed into the outer sleeve 32. A piston 36' is slidable in the bore of the sleeve and is provided with a tubular rod 38' the lower end of which is constricted to form a small, spray-producing orifice 50'. The rod 38' is guided by a member 42' in the lower portion of the casing. The member 42' also supports a spring 52 which presses upward against the piston 36'. At the upper end of the casing 30' is a transverse member 34' which acts as a stop to limit the upward movement of the piston and also supports a cleaning needle 60 aligned with the orifice 50'. The length of the needle 60 is such that when the piston is in its lower or operating position, the needle is clear of the orifice 50', as indicated in Figure 9. When the spring 52 is allowed to push the piston 36' to its upper position, the needle 60 extends through the orifice 50'. Thus if the orifice 50' becomes clogged, the water to the pipe 20 can be turned off. This causes the piston to rise and the needle 60 to extend through the orifice 50'. In so doing, the needle pushes the clogging matter out through the orifice 50' and thus clears it. A cup washer 54 is on the piston 36' and fits in the bore of the casing so that when the water supply is turned on again, the pressure of the water entering through the large openings at the upper end of the casing pushes the piston down so that its tubular rod resumes its spraying function.

To avoid the necessity for constant inspection of the spray nozzles, the water supply to the shower pipe 20 may be periodically turned off for a moment, then turned on again by automatic controlling apparatus well known in the art. Such apparatus is schematically indicated in

Figure 1 and may consist of a solenoid or other electric motor 62 connected through a timing mechanism 64 to a suitable source of electric energy by a cable 66. The timer can be set to close the valve at regular intervals of any desired length.

We claim:

1. In combination with a spray pipe, a spray nozzle projecting through the wall of said pipe, said spray nozzle comprising a tubular body secured near its outer end to the wall of the pipe, said body being open at its inner end and closed at its outer end except for a central bore of reduced diameter, a piston slidably fitted in said tubular body, said piston having a tubular piston rod open at both ends and slidably fitted in said central bore of reduced diameter a bracket projecting from the outer end of said body, said bracket including a shelf extending across the axis of said rod and engageable by the outer end of the rod, and a spring pressing said piston toward the inner end of said body.

2. A spray nozzle comprising an interiorly threaded outer sleeve having at one end a radial flange, an exteriorly threaded inner sleeve extending through said outer sleeve and in threaded engagement therewith, said inner sleeve having a radial flange bearing against the flanged end of the outer sleeve, a plug mounted in the flanged end of the inner sleeve, said plug having a central bore, a piston slidably fitted with said inner sleeve, said piston having a tubular piston rod open at both ends and slidably fitted in the bore of said plug, a bracket projecting from said plug, said bracket including a shelf spaced from the end of the plug and projecting across the axis of said piston rod, and a spring within said inner sleeve pressing said piston away from said plug.

3. In a paper-making machine, a horizontal spray pipe, and a plurality of spray nozzles projecting up through the bottom of said pipe, each said spray nozzle being mounted with its major portion within the pipe and comprising a tubular body secured near its lower end to the pipe wall and projecting upward into the interior of the pipe, said body being closed at its lower end except for a bore of smaller diameter, a piston slidably fitted in said tubular body, a tubular piston rod extending down from said piston and slidably fitted in said bore, a bracket including a shelf extending down from the lower end of said body and engageable by the lower end of said piston rod, and spring means in said body pressing said piston upward.

References Cited in the file of this patent

UNITED STATES PATENTS

1,018,020	Werner	Feb. 20, 1912
1,826,977	Baker	Oct. 13, 1931
2,092,519	McLean	Sept. 7, 1937
2,311,018	Bahnsen	Feb. 16, 1943
2,680,043	Campbell	June 1, 1954