Jan. 12, 1954 A. E. BROUGHTON 2,665,946

SPRAY NOZZLE

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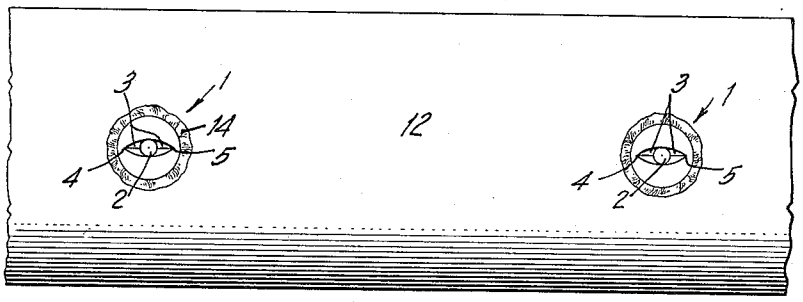


FIG. 1

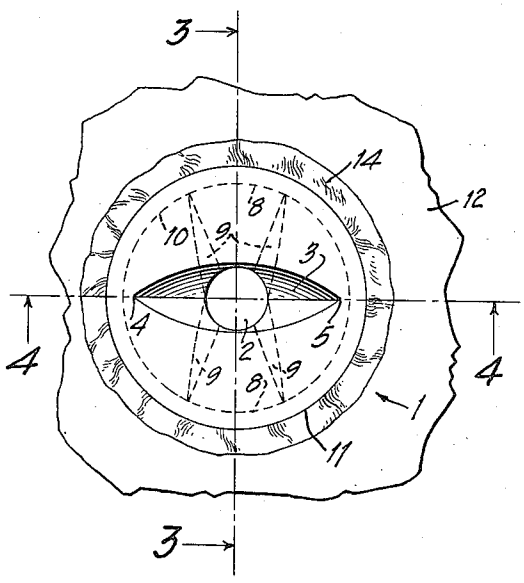


FIG. 2

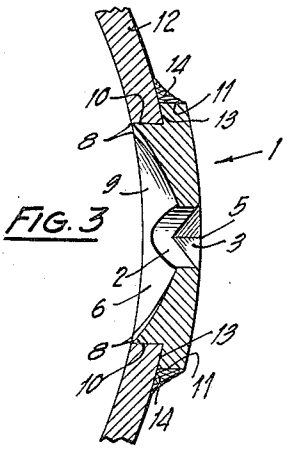


FIG. 3

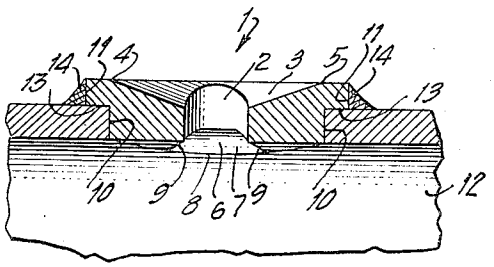


FIG. 4

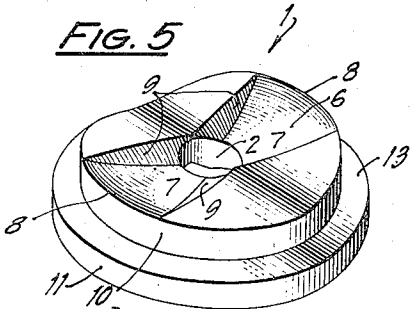


FIG. 5

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SPRAY NOZZLE

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5 Claims. (Cl. 299—104)

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My invention relates to spray nozzles and particularly to nozzles which are adapted to discharge a fan-shaped spray and which are, or may be, associated with a tubular element through which water is supplied thereto.

Shower pipes or tubes having nozzles of this general character are widely used on papermaking machines and white water is fed to the shower under pressure and discharge from a plurality of said nozzles which are spaced longitudinally of the tube.

Nozzles of the type to which this invention relates are well known in the art but, so far as I am aware, have heretofore been made in the form of flat, cylindrical discs which have been soldered or otherwise secured to the shower pipe or tube over holes drilled in said pipe. Thus, within the pipe and around each of the discharge orifices in the nozzles is a depression in which foreign matter can collect, and it is difficult or impossible to remove this matter by moving anything through the tube.

One of the objects of my invention is to provide a spray nozzle of this type which, instead of being affixed to the outside of the tube, may be inserted in an opening therein; which will be provided with an inner face or surface which is cylindrical and of the same radius or diameter as the inner radius or diameter of the tube; and which, when inserted in the tube, will conform to the curvature of the inner surface of the tube, and, in effect, form a portion thereof. Thus, except for the inlets to the nozzles, the inside of the tube will be a smooth, uninterrupted cylindrical surface so that a piston, which is closely fitted in the tube, may be pushed therethrough to sweep or push out any foreign matter which may collect therein. Another object is to provide a spray nozzle of this type which is provided with an annular shoulder between the inner and outer faces thereof which will rest upon the outer surface of the tube when the inner face or surface of the nozzle is in exactly the right position in the opening in the tube. In other words, to provide a shoulder which will limit the extent to which the nozzle may be inserted in the opening in the tube.

I accomplish these objects in the manner described below and illustrated in the accompanying drawing in which—

Fig. 1 is a fragmentary bottom view of a shower pipe or tube showing two of my nozzles associated therewith;

Fig. 2 is an enlarged plan view of a fragmentary portion of the shower tube having one of my nozzles secured therein;

Fig. 3 is a section of Fig. 2 in the plane 3—3;

Fig. 4 is a section of Fig. 2 in the plane 4—4; and

Fig. 5 is a perspective view of my nozzle with the inner face thereof on the upper side.

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Referring to the drawing—

My nozzle comprises a generally cylindrical, button-like element, indicated by the numeral 1, and which is provided with a centrally-disposed, circular discharge orifice 2. The outer face of the button is provided with a diametrically-extending groove 3 therein which is perhaps best shown in Figs. 2 and 3. This groove intersects the discharge passage 2, is symmetrically-disposed with respect thereto, and is of substantially the same width in the center thereof as the diameter of said passage. From the center, the groove 3 decreases in width and depth, and becomes mere points 4 and 5 at its end where it intersects the outer face of the nozzle.

In the inlet face of the nozzle there is another diametrically-extending groove 6 which has its axis disposed at right angles to the groove in the outer face. This groove, like the one on the outer face, is deepest at the center where it intersects the discharge passage 2, is symmetrically-disposed with respect to said passage, and decreases in depth but increases in width as it slopes upwardly from its intersection with the discharge passage to its intersections 8 with the inner face of the nozzle. The sides 9 of the groove 6 slope outwardly from the bottom thereof to their intersection with the inlet face of the nozzle.

Nozzles having grooves of the character described above are well known in the art and no novelty resides therein. The opposed portions of the inner groove on opposite sides of the discharge passage form opposed channels through which the water flows in opposite directions towards the discharge passage. These oppositely flowing streams of water collide or flow together at the discharge orifice, and this confluence and the groove 3 in the outlet face of the nozzle deflect the discharging water into a fan-shaped spray disposed at right angles to the groove in the inner face of the nozzle.

Generally speaking, my nozzle may be said to comprise two cylindrical portions 10 and 11 which are coaxial with the discharge passage but of different diameter; the cylindrical portion 10 of smaller diameter conforming in size to the opening in the tube 12, and its height or altitude being equal to the thickness of the wall of the tube 12.

When the cylindrical portion 10 of smaller diameter is inserted in the hole in the tube 12, the flange or shoulder 13 will lie in contact with the outer surface of the tube. The surface of the inlet face of the button is cylindrical and of the same radius and coaxial with the inner surface of the tube and, the surface of the shoulder 13 is, preferably, also a cylindrical surface coaxial with the surface of the inlet face but having a radius equal to the radius of the outer surface of the tube. The common axis of the

cylindrical surfaces of the inlet face and the flange or shoulder 13 is parallel with the longer axis of the groove 3 in the outlet face of the button. Thus, when the nozzles are positioned in the holes in the tube with the longer axes of the grooves 3 parallel to the axis of the tube, the shoulders 13 will closely fit the outer surface of the tube. When placed in the tube openings, the nozzles will almost automatically adjust themselves so that these axes are parallel and they may be secured in the tube by solder, as shown at 14. The outlet face of the nozzle is preferably, but not necessarily, also cylindrical and coaxial with the inlet face.

From the foregoing, it will be apparent that when the nozzles are secured in the tube, the inner surface of the tube will be a smooth, continuous, cylindrical surface except where interrupted by the grooves 6 in the inner faces of the nozzles so that a piston, or other means, which may be periodically forced through the pipe in order to maintain it perfectly clean may be closely fitted therein.

While I have described my invention in its preferred embodiment, it is to be understood that the words which I have used are words of description rather than of limitation and that changes, within the purview of the appended claims, may be made wtihout departing from the true scope and spirit of my invention in its boarder aspects.

What I claim is—

1. A shower pipe comprising an elongated tube formed of rigid material and having a plurality of longitudinally-spaced openings with cylindrical side walls; nozzles secured in said openings comprising button-like discs having a cylindrical portion closely fitted in said cylindrical openings and provided with a centrally-disposed discharge pasage extending therethrough; the inlet face of said discs being a cylindrical surface coaxial with and of substantially the same radius as the inner surface of said tube and provided with a diametrically-extending groove therein communicating with said discharge passage; the outlet faces of said discs being provided with a diametrically-extending groove therein disposed at right angles to the groove in the inlet face and also communicating with said passage; whereby, fan-shaped jets will be discharged from said nozzles, the inner surface of said tube will be a smooth, cylindrical surface interrupted only by the grooves in the inlet faces of said nozzles, and a piston closely fitted in said tube may be freely reciprocated therein.

2. A shower pipe comprising an elongated tube formed of rigid material and having a plurality of longitudinally spaced cylindrical openings therein, nozzles secured in said openings and comprising button-like discs having a cylindrical portion closely fitted into said cylindrical openings and provided with a centrally disposed discharge passage extending therethrough, the inlet face of said discs being a cylindrical surface coaxial with and of substantially the same radius as the inner surface of said tube, said discs having portions projecting laterally beyond said cylindrical portions in outwardly spaced relation from the inlet face of said discs and lying in abutting contact with the outer surface of said tube to positively position said cylindrical inlet face portions relative to the inside surface of said tube, and said laterally projecting portions defining a cylindrical surface coaxial with and of substantially the same radius as the engaged

outer tube surface, the inlet faces of said discs being provided with a diametrically extending groove therein communicating with said discharge passage, the outlet faces of said discs being provided with a diametrically extending groove therein disposed at right angles to the groove in the inlet face and also communicating with said passage, said grooves producing a fan-shaped discharge of liquid through said openings, the cylindrical inlet face of each disc producing a smooth, cylindrical inside tube surface interrupted only by the grooves in the inlet faces of said nozzles to permit a closely fitted piston to be freely reciprocated in said tube.

3. The structure set forth in claim 2, wherein the grooves in the outlet faces of said discs are substantially parallel to the axis of the tube.

4. A spray nozzle adapted to be inserted into a cylindrical opening formed through the side wall of a tubular member, said nozzle comprising a unitary insert button having a discharge opening therethrough and provided with a cylindrical portion to be closely fitted into the cylindrical opening in said tubular member, said button having portions projecting laterally beyond said cylindrical portion and defining a cylindrical surface of substantially the same radius as the outer tube surface and adapted for engagement therewith to positively position the inlet face of said button, said inlet button face being cylindrically curved and having the same radius of curvature as the inside surface of the tube whereby, when a button is received in the opening of a tube with the inside cylindrical surface of the button positioned in coaxial relationship with the tube and the laterally extending portions engaged with the outside of the tube, a smooth, substantially uninterrupted inside cylindrical surface is produced within the tube.

5. A shower pipe comprising an elongated tube formed of rigid material and having a plurality of longitudinally spaced cylindrical openings formed through the side wall thereof, a plurality of nozzles respectively secured in said openings and comprising a unitary insert button having a cylindrical portion closely fitted into a selected opening and provided with a discharge opening therethrough, the inlet face of said button having a cylindrical surface coaxial with and of substantially the same radius as the inner surface of said tube, each of said buttons having portions propecting laterally beyond the cylindrical portions and disposed in outwardly disposed relation from the inner face of said buttons and defining a cylindrical surface coaxial with and of substantially the same radius as the outer tube surface to engage portions of the outer surface of said tube surrounding the cylindrical openings therein and positively position the inside cylindrically curved surface of said button to produce a smooth cylindrical, substantially uninterrupted inside tube surface wherein a piston closely fitted within the tube may be freely reciprocated therein.

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