Devices provided with orifices for expelling a jet or spray of liquid are subject to frequent breakdown due to clogging of the orifices with particles of scale, sediment, and the like. There has long been a need for a self-cleaning spray head, but the self-cleaning heads that have been devised heretofore have been very expensive, and so complicated that they did not stay in operating condition much better than an ordinary spray head.

The principal object of the invention is to provide an orifice construction that is efficiently self-cleaning, simple, and inexpensive. More specific objects and advantages are apparent from the description, in which reference is had to the accompanying drawing illustrating preferred embodiments of the invention.

Fig. I is a longitudinal section of a spray head of the jet and rotor type; Fig. II is an end elevation thereof, with portions broken away to show the interior construction.

Fig. III is a plan, partly in section, of a centrifugally dispersing type of spray head; Fig. IV is an elevation thereof, partly in section.

The specific drawing and the specific description that follows merely disclose and illustrate the invention and are not intended to impose limitations upon the claims.

An apparatus embodying the invention is self-cleaning by virtue of a resilient diaphragm in which the orifice is formed, which moves from one position to another as the liquid pressure varies. The diaphragm may be adapted to snap from one position to another with such force as to dislodge obstructing particles from the orifice, or a fixed, tapered member may be so associated with the orifice that the tapered member clears the orifice as the diaphragm moves.

The body 10 of the device shown in Fig. I has a pipe tap in one end and has its other end externally threaded. Seated in the externally threaded end of the body are a series of disk-shaped filtering screens 11 held apart by a series of spacers 12. The lowermost screen in Fig. I is the coarsest and the screens are successively finer, with the finest screen on top. Thus the lower screen catches the coarse particles, and the fine particles are caught by the other screens. If all the screens were of the same mesh, the lowermost screen would catch all the particles and the effective filtering area would be about one-fourth as great as it is in the construction shown.

Bearing upon the uppermost screen and upon the upper rim of the body 10 is a hard rubber gasket 13 upon which is a sleeve 14. The resilient diaphragm 15 is clamped upon the sleeve 14 by means of a collar 16 threaded upon the body 10. Fixed in a seat 17 integral with the sleeve 14 is a standard 18 having a tapered portion extending through the aperture in the diaphragm. A dispersing rotor 19, having its axis coinciding with that of the standard 18, is journaled upon the upper end of the standard.

When liquid under pressure enters the body 10, the resilient diaphragm 15 is flexed upward and a stream of liquid is discharged through the orifice. Rotation of the dispersing rotor 19 is produced by the stream of liquid, and as a result the liquid is dispersed in the form of a spray. Each time the diaphragm 15 is allowed to return to its inward position the tapered portion of the standard 18 cleans out the orifice.

The body 20 of the device of Fig. III has an enlarged hexagonal end provided with a pipe tap. Threaded into the body 20, instead of the pipe tap, is a disc 21 in which is fixed a pointed pin 22. A resilient diaphragm 23 is held in place by the threaded disc 21, and the tapered point of the pin 22 extends into a central orifice in the diaphragm, helping to direct the stream of liquid.

A cap 24 is threaded into the body 20 with its axis at right angles to the pin 22, and a bore 25 co-axial with the pin 22 registers with a tangential opening in the side of the cap 24. Thus a stream of liquid discharged through the orifice in the diaphragm 23 passes through the bore 25 and enters the cap 24 tangentially. The cap 24 holds in place a second apertured diaphragm 26. Bearing against the outside of the diaphragm 26 is a spiral spring 27 which is applied with variable tension by a collar 28 threaded into the body 20.

When liquid enters the body 20 under pressure, the resilient diaphragm 23 is flexed outward and a stream of liquid is discharged from the orifice in the diaphragm into the cap 24. The cap 24 fills with liquid, which is kept rapidly whirling by the tangentially entering stream, and the pressure of the liquid in the cap snaps the second diaphragm 26 outward against the pressure of the spring 27. Because of the whirling motion of the liquid in the cap 24 a conical spray instead of a stream or jet is discharged through the second diaphragm 26. Whenever the water pressure is shut off, the first diaphragm 23 snaps to the right, causing foreign matter...
to be dislodged from the aperture by the pin 22. It is desirable that a small aperture be used for the tangential discharge of liquid into the bore 25 in order that the liquid in the cap 24 may be kept whirling at a high velocity.

Each of the resilient diaphragms may be stamped in a die that gives the diaphragm the proper shape. The second diaphragm 26 in the device of Fig. IV should be so formed that it moves past a dead center position with sufficient snap to dislodge obstructions from the orifice. The diaphragms 15 and 23 are provided with positively acting cleaning members, but it is preferable that they move with a snap also. The orifice in the diaphragm 23 is preferably formed by means of the needle 22. When the parts are first assembled, a thick metal washer is placed inside the diaphragm. The washer is removed after the diaphragm has been pierced by the needle.

The diaphragm 26 is intended to be so formed that the pressure which causes it to snap outward is only slightly greater than the pressure which allows it to snap back to its inward position. For example, the diaphragm 26 may be so formed that it snaps outward when the liquid pressure rises to 10 pounds per square inch and snaps back when the pressure falls to 5 pounds per square inch. The purpose of the spring 27 is to raise the operating range of the diaphragm 26. Thus the spring may be applied with such a pressure that the working range of the diaphragm 26 is 35 to 40 pounds per square inch.

The spring pressure should be so adjusted that the operating range is within the normal variation in the pressure of the liquid supply. Then the diaphragm 26 will snap back and forth as the liquid pressure rises and falls during the day, and the device of Fig. IV may be operated continuously without clogging of the spray nozzle.

The diaphragm 15 in Fig. I is intended to remain in its outward position all during the time while the liquid is being supplied. Thus the device of Fig. I keeps the orifice clean if the liquid is simply turned off and on occasionally. The resilient diaphragms, the standard 18 and the pin 22 are preferably made of stainless steel, and the other metal parts may be made of brass.

The construction illustrated in the drawing may be modified and various embodiments of the invention may be devised to meet various requirements.

Having described my invention, I claim:

1. In an apparatus of the class described, in combination, a chamber to which liquid may be supplied under pressure, a resilient metal diaphragm closing the chamber at one end and provided with an orifice in the diaphragm proper for ejection of liquid from the chamber, which is bulged to a slight enough extent so that it is adapted to snap inward and outward past dead center with normal variations in the pressure of the liquid supply, said orifice being open for free passage of liquid in both its inward and outward positions, and resilient means for exerting pressure upon the diaphragm from the exterior, the pressure exerted by said resilient means being small enough to permit the diaphragm to snap outward when the liquid pressure rises above its average value, and great enough to cause the diaphragm to snap inward when the liquid pressure falls below its average value during normal fluctuations in pressure.

2. In an apparatus of the class described, in combination, two chambers to which liquid may be supplied under pressure, and a resilient metal diaphragm closing each chamber at one end and provided with an orifice in the diaphragm proper for ejection of liquid from the chamber, which is adapted to snap from one position to another as the liquid pressure varies, said chambers being so arranged that the liquid from one chamber is discharged from the diaphragm orifice tangentially into the other chamber, and the tangentially discharging diaphragm orifice being provided with a fixed member that has its free end extending through said orifice when the diaphragm is in its inward position and is free of said orifice when the diaphragm is in its outward position.

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