

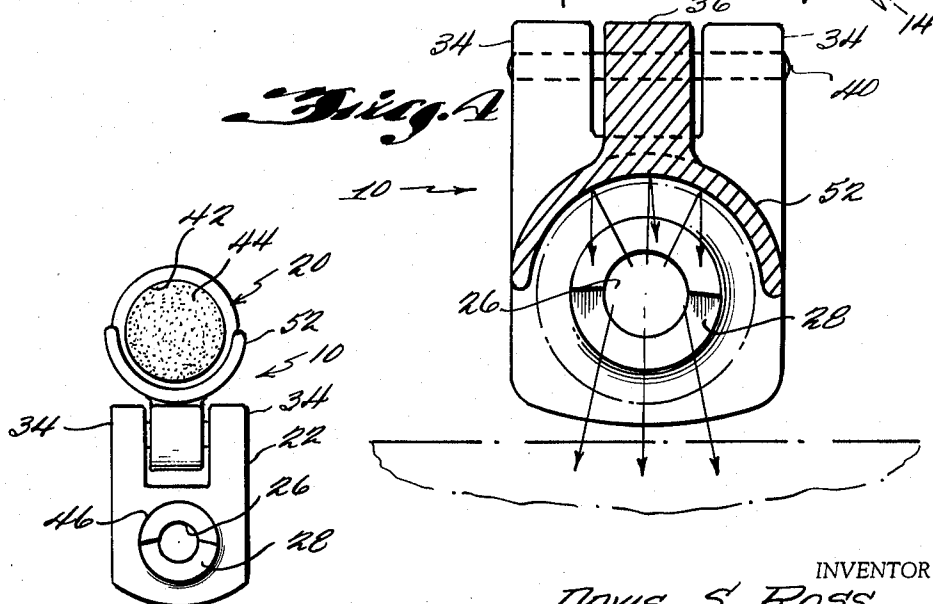
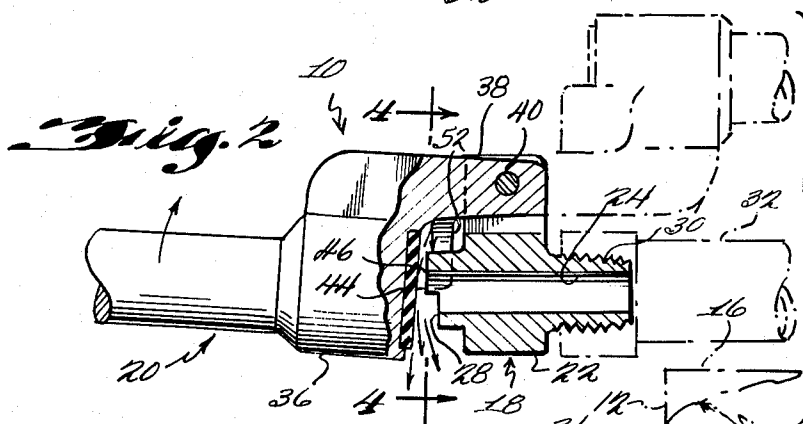
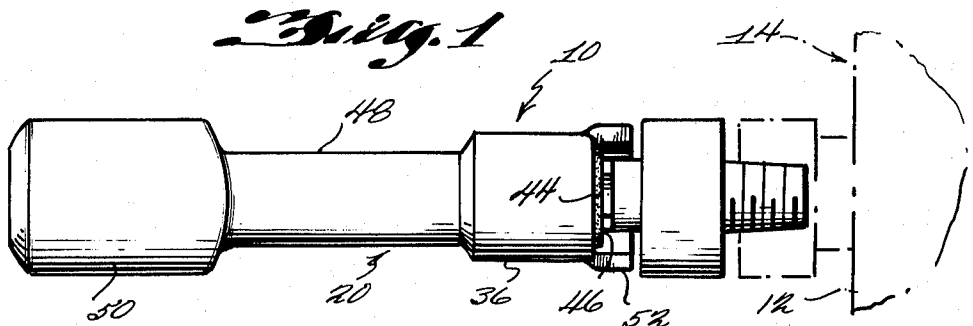
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SPRAY NOZZLE

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3,257,079

## SPRAY NOZZLE

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5 Claims. (Cl. 239-113)

The present invention relates to improved liquid diverting spray nozzles for use in fluid systems and more particularly to an improved spray nozzle for use in waste treatment tanks and the like. The spray nozzle of the present invention is an improvement over the nozzle disclosed in United States Patent No. 3,066,870, issued December 4, 1962, to Edwin E. Hanson, the aforementioned patent and the instant application having a common assignee, namely, The Amcodyne Corporation, of Lorain, Ohio.

In waste treatment plants of the type wherein an aeration tank is used for aerating waste containing liquors, there is a problem of froth developing on the surface of the admixture in the aeration tank. As disclosed in the copending application, Serial No. 280,946, of David S. Ross and Gene W. Ross, filed May 16, 1963, spray nozzles of the type shown in the aforementioned United States Patent 3,066,870, are positioned at spaced intervals along the side walls of the tank for spraying a clear effluent of water from a common supply pipe. The spray from the nozzles is utilized to control or beat down the froth which may appear on the surface of the admixture in the aeration tank.

Periodically the nozzles must be checked to determine whether there is any accumulation of foreign matter which would affect their predetermined normal spray pattern. The inspector makes the check by swinging an adjustable part of the nozzle from its first liquid diverting position upwardly so that the outlet of the fixed part of the nozzle and the diverting face of the adjustable part of the nozzle may be examined and cleaned, if necessary. While the nozzles of the type disclosed in the aforementioned Patent No. 3,066,870 have been effective in such an operation, difficulties have still been encountered. When the inspector initially swings the adjustable part of such a nozzle upwardly, oftentimes there is an upward spray of effluent or water causing the catwalks or walkways around the edge of the tank to become wet and slippery. This creates an extremely hazardous condition in waste treatment plants as an inadvertent slip by the inspector could result in falling into the admixture which could be and often is fatal. It will be appreciated that the admixture in an aeration tank is not as buoyant as water as it is aerated and, consequently, even though an inspector could be an excellent swimmer, the admixture would not support him and he would immediately sink to the bottom of the tank.

Therefore, an important object of the present invention is to provide an improved type of spray nozzle in which an adjustable part of the same cooperating with a fixed part can be operated to inspect and clean the same and yet will prevent the flow of effluent or water therefrom from being sprayed upwardly and splashed onto the walkway around or over the tank during the initial portion of the movement of the adjustable part.

Another object of the present invention is to provide an improved spray nozzle for use in fluid systems in which an adjustable part of the same is moved relative to a fixed part from a first liquid diverting position to a second position wherein another flow condition is initiated, the second flow condition being such that the liquid such as in effluent or water does not divert upwardly above a horizontal axis.

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Ancillary to the preceding object, it is a further object of the present invention to provide a spray nozzle with an improved flow diverting face in the form of a gasket frictionally held in position, yet removable and replaceable. Heretofore, such flow diverting faces have been made of gaskets positively held by set screws or the like and after continued use, the set screws were subject to corrosive action making it difficult to replace the gasket.

Still another object of the present invention is to provide an improved spray nozzle of the character described which is easy and inexpensive to manufacture and service.

These and still further objects and advantages of the present invention appear more fully in the following specification, claims and drawings, in which:

FIGURE 1 is a bottom plan view of the improved spray nozzle of the present invention illustrating the nozzle positioned outwardly of a wall of a tank shown schematically in broken lines;

FIGURE 2 is a side elevational view of the spray nozzle of FIGURE 1 shown partly in section on the line 2-2 of FIGURE 1 and further showing the movable nozzle part just as it is being moved toward its raised position and with the movable nozzle part in its raised position in dotted lines;

FIGURE 3 is a front elevation view of the fixed part of the improved spray nozzle, and illustrating the movable part of the spray nozzle in its raised position; and

FIGURE 4 is an enlarged sectional view taken substantially on the line 4-4 of FIGURE 2 and illustrating the direction of impingement and diversion of liquid as the movable part is being raised toward its upward position.

Referring now to the drawings wherein like character and reference numerals represent like or similar parts, the improved spray nozzle of the present invention is indicated in its entirety by the numeral 10, the nozzle being made of any suitable material such as metal or plastic depending on the liquid being discharged. The nozzle 10 is illustrated in a position extending outwardly of a vertical wall 12 of a tank generally indicated by the numeral 14, the tank 14 having a walkway such as a deck or catwalk 16. The tank 14 may be of any type of liquid containing tank where it is desirable to spray liquid into the tank downwardly adjacent the vertical walls of the tank. However, a preferable use of the spray nozzle is with a tank 14 such as a waste treatment aeration tank wherein the tank contains an admixture of aerated waste containing liquor. The spray nozzle 10 is utilized to discharge a clear effluent or water in a downwardly directed spray pattern onto the surface of the admixture in the tank so as to control or beat down any froth developing thereon and moving toward the side walls of the tank.

The spray nozzle 10 is composed basically of two parts, one of the parts being referred to herein as a fixed nozzle part 18 and the other part being referred to herein as a movable or adjustable nozzle part 20. The fixed nozzle part 18 includes a nozzle body member 22 having a fluid passageway 24 therethrough terminating to an outlet opening or orifice 26 in its front end face 28. The outlet opening 26 which lies in the plane of the front end face 28 is transverse of the axis of the passageway 24 and therefore the direction of flow of liquid from the outlet 26 is normally at right angles to the front end face 28. The nozzle body member 22 is further provided at its end opposite the front end face 28 with exterior threads 30 so as to enable the spray nozzle 10 to be readily insertable into a supply pipe 32 of a fluid system.

The movable nozzle part 20 is pivotally connected to the nozzle body member as best shown in FIGURES 2, 3, and 4. In more detail, the nozzle body member 22 is

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integrally provided with a pair of upstanding ears or hinge arms 34, whereas the movable nozzle part 20 includes a diverter head member 36 having an upstanding arm portion 38 integrally attached thereto which is disposed between the hinge arms 34 and pivotally anchored thereto by means of a hinge pin 40.

The diverter head member 36 is substantially cylindrical in configuration and is provided with a circular recess 42 (FIGURE 3) adapted to frictionally receive a gasket 44. The gasket 44 defines a flow diverting face for the diverter member 36, the gasket being made of elastomeric materials such as rubber or rubber-like products, leather, or plastic materials. By having the gasket 44 frictionally held in the recess 42, the gasket can have an uninterrupted planar face which provides for an accurate spray pattern and, further, may be easily replaced as there is no screw to become corroded.

Extending outwardly of the front face 28 of nozzle body member 22 is an arcuate rib 46. The rib 46 extends around substantially the upper half or 180° of the outlet opening 26, the arcuate rib being arranged to have sealing engagement with the gasket 44 (FIGURE 1) when the movable nozzle part 20 is in a liquid diverting position. When the gasket 44 is in sealing engagement with the arcuate rib 46, the diverter face of the gasket is parallel to the front face 28 of the nozzle body member 22. This arrangement is substantially identical with that disclosed in the aforementioned United States Patent 3,066,870 and thus when liquid is flowing through the passageway 24 in a horizontal direction, the liquid will impinge against the diverting face of the gasket 44 and then any liquid splashing upwardly will be directed downwardly by the arcuate rib 46 onto the surface of the admixture in the tank 14.

The angle of the spray pattern of the nozzle 10 may be varied by changing the length of the arcuate rib 46 or by changing the shape of the rib's interior surface. Additionally, the gallonage discharge by the nozzle can be varied to a maximum gallonage for a given head pressure through an unobstructed orifice by changing the longitudinal length of the rib 46 so as to vary the distance between the gasket 44 and the front face 28 of the nozzle body member 22.

The movable nozzle part 20 is provided outwardly of the diverter body 36 with a cylindrical portion 48, the cylindrical portion 48 having its outer end provided with a weight 50. The weight 50 is sufficiently heavy to cause the movable part 20 and its diverting face defined by the gasket 44 to remain in sealing engagement with the arcuate rib 46 against the resulting force asserted by the impinging liquid stream from the outlet opening 26 of the passageway 24.

When it is desired to inspect the gasket 44 as well as the nozzle body member 22 for any accumulation of foreign matter or the like, the movable nozzle part 20 is swung upwardly to the dotted line position of FIGURE 2. When in this position, the direction of the liquid stream is changed as the diverting face of the gasket 44 is in an out-of-the way position, as shown in FIGURE 3, and thus liquid flowing from the outlet opening or orifice 26 has a free flow in a generally horizontal direction, thereby sweeping any accumulation of foreign matter from the passageway 24 or the orifice. At this time, the gasket 44 can readily be examined and cleaned or removed and replaced, if damaged.

As mentioned at the outset of the specification, often-times liquid flowing out of the orifice 26 will spray upwardly as soon as initial movement of the nozzle part 20 is made because the gasket 44 breaks its sealing contact with the arcuate rib 46. Liquid coming out of the orifice 26 will impinge upon the gasket and spray in all directions until the angle of the gasket with respect to the angle of the stream of liquid from the nozzle body member 22 is such as to deflect the liquid downwardly or permit the liquid to flow unobstructed in a generally horizontal direction.

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As shown in FIGURES 2 and 4, an improvement of the present invention prevents the above condition from occurring and thus the walkway 16 such as a deck or catwalk is maintained dry. The diverting head 36 is provided with an arcuate rib 52 extending outwardly of the face of the gasket 44 toward and overlapping at least a portion of the nozzle body member 22. The arcuate rib 52 is concentric with and spaced from the arcuate rib 46 and surrounds substantially half of the diverting face of the gasket 44 when the movable nozzle part 20 is in the diverting position shown in FIGURE 1. In this position, the arcuate rib 52 is not functioning as a shield because the arcuate rib 46 is diverting downwardly any upward flow of liquid which has been previously impinged upon the face of the gasket 44. However, as soon as the movable nozzle part 20 has been moved in a clockwise direction as shown in FIGURE 2 so as to break the seal between the arcuate rib 46 and the gasket 44 the liquid coming from the orifice 26 is impinged upon the gasket and will spray upwardly as well as downwardly but the arcuate shaped rib 52 will divert any of the upwardly directed liquid back downwardly into the tank 14. Because the arcuate rib 52 extends over a portion of the body member 22 when the movable part 20 is in the diverting position, substantial movement of the movable part 20 can be made by the inspector before the outer edge of the arcuate rib 52 clears the outer edge of the arcuate rib 46 and by this time the gasket 44 will have its face at such an angle to the liquid impinging thereon that all of the liquid will be deflected downwardly until such time that the face of the gasket 44 is moved out of the horizontal path of the liquid.

It will thus be seen that the objects of this invention have been fully and effectively accomplished. However, it will be realized that the foregoing specific embodiment has been shown and described only for the purposes of illustrating the spirit and principles of this invention, the spray nozzle being subject to some modifications without departing from such spirit or principles. Therefore, the terminology used throughout this specification is for the purposes of description and not limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. In a spray nozzle comprising: a body member having a front end face and a passageway therethrough with an outlet opening in the front end face, said body member being connectable to a source of liquid for the flow thereof through the passageway, and a liquid flow diverter member having a liquid flow diverting face for cooperation with the front end face of said body member, said diverter member being pivotally connected to the body member for vertical swinging movement between a liquid diverting position where the flow diverting face thereof is in front of and generally parallel to the front end face of the body member and an out-of-the way position where said flow directing face is upwardly away from the front end face, said diverter member being weighted so that its flow diverting face normally remains in said liquid diverting position until the diverter member is manually swung upwardly to the out-of-the way position, said body member having on its face an arcuate rib engaging the face of the liquid flow diverter member when the flow diverting face of the diverter member is in liquid diverting position, said arcuate rib being located immediately above the outlet opening in the front end face of the body member for directing liquid emerging from the outlet opening downwardly, the improvement comprising means on said liquid flow diverter member for shielding and diverting liquid downwardly when said flow diverting face is moved upwardly out of engagement of said arcuate rib toward its out-of-the way position.

2. A spray nozzle as claimed in claim 1 in which said arcuate rib is integral with said body member and extends around substantially the upper half of said outlet opening and in which said means includes an arcuate rib

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integral with said flow diverter member and concentric with and positioned above said first-mentioned arcuate rib when the flow diverting face of the diverter member is in the liquid diverting position.

3. In a spray nozzle comprising: a body member having a front end face and a passageway therethrough with an outlet opening in the front end face, said body member being connectable to a source of liquid for the flow thereof through the passageway, and a liquid diverter member having a liquid flow diverting face for cooperation with the front end face of said body member, said diverter member being pivotally connected to said body member for vertical swinging movement between a liquid diverting position where the flow diverting face thereof is in front of the generally parallel to the front end face of the body member, and an out-of-the way position where said flow diverting face is upwardly away from the front end face, said diverter member being weighted so that its flow diverting face normally remains in said liquid diverting position until the diverter member is manually swung upwardly to the out-of-the way position, said body member having on its front end face an arcuate rib engaging the flow diverting face on the diverter member when the same is in said liquid diverting position, said arcuate rib being located immediately above the outlet opening in the front end face of the body member for directing liquid emerging from the outlet opening downwardly, the improvement comprising a second arcuate rib provided on the liquid flow diverter member, said second arcuate rib being concentric with and positioned above said first arcuate rib and overlapping a portion of said body member when the flow diverting face of the diverter mem-

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ber is in liquid diverting position and during at least a first portion of movement of the flow diverting face towards the upwardly out-of-the way position to thereby direct liquid downwardly.

4. A spray nozzle as claimed in claim 3 including a circular recess in the flow diverting face of said diverter member, and a gasket frictionally held in said recess and engageable by said first arcuate rib when said flow diverting face is in said liquid diverting position.

5. A spray nozzle as claimed in claim 3 in which said first arcuate rib extends around substantially the upper half of said outlet opening in the face of said body member, and in which said second arcuate rib is spaced outwardly of said first arcuate rib and extends around substantially the upper half of said liquid diverting face.

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