

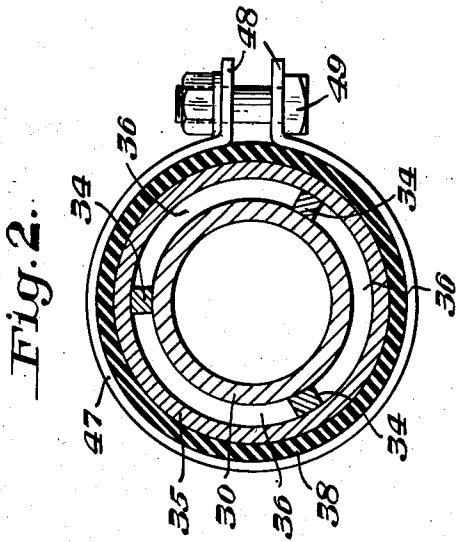
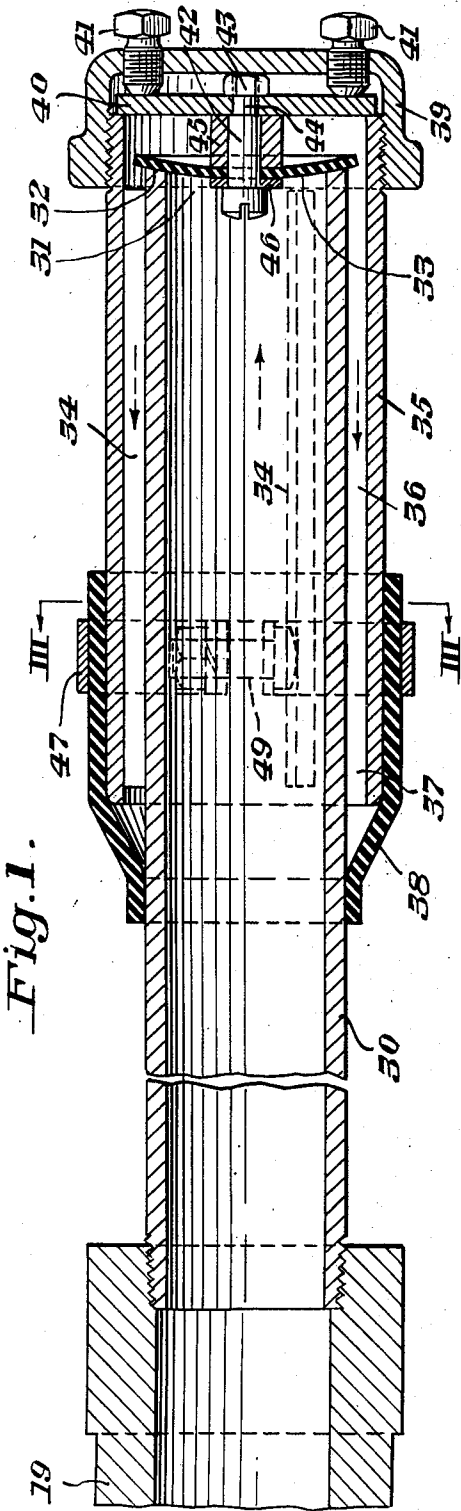
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VALVED WATER INLET NOZZLE FOR CONCRETE MIXERS OR THE LIKE

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VALVED WATER INLET NOZZLE FOR CONCRETE MIXERS OR THE LIKE

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This invention relates to nozzles adapted to periodically discharge liquids into closed spaces and to prevent passage of material from such spaces back into such nozzles between such discharge periods. More particularly, such invention pertains to water inlet nozzles projecting into and below the top of rotating drums on mobile and stationary concrete mixers or the like.

It is broadly old in the concrete mixer art, such as a high discharge truck mixer, to have a water inlet nozzle projecting into the rotating mixing drum to supply water for the mix in suitable quantity and at a suitable pressure in a backward direction by means of a flow-reversing cap to keep the material in the mixer from getting into the nozzle when the water is shut off. It is also old to insert a single check valve in the nozzle passage in the form of an annular diaphragm or flange. In practice, the flow-reversing cap even when used with the valve did not prevent material from flowing or working its way back into the nozzle with detrimental effect. The use of the valve was an improvement but it was subjected to severe wear by the gritty materials in the mixing drum and it offered large surfaces to back pressures which had to be resisted in substantial measure by the inherent stiffness of the valve itself. Moreover, there was no extensive surface contact between the valve and the zone being sealed with the result that it was easier for gritty material to work itself around the valve and into the nozzle. As a consequence, the user of the apparatus had to contend with the problem of cementitious material hardening on the various component parts of the nozzle, thereby changing the water delivery rate to the mixing drum if the nozzle remained operative at all. In addition, since the type of substantial pressure fast discharge pumps used for example on a truck mixer are generally located below the nozzle outlet, when gritty material such as sand and Portland cement got into the nozzle, it would work itself back into the pump parts and either quickly destroy or impair their operation.

The foregoing difficulties are overcome in this invention by the provision of an inner and an outer valve in which the inner valve is protected from the impact of crushed stone, gravel, sand, or cement during the mixing operation and, hence, remains undisturbed and tightly closed. The outer valve constituting an elastic tube or sleeve operates by radial expansion of the tube during discharge from the nozzle, has substantial surface contact with the fixed parts thereof and

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is generally effected by outside pressure in the mixing drum to more tightly seal the nozzle when it is not discharging. These valves individually act as check valves and are maintained and held in place by a simple yet highly novel and efficient arrangement of parts. The outer valve is affixed to other parts of the nozzle in such a manner that it can readily be replaced when the wear thereof warrants. Other objects and advantages of this invention will be apparent from the following description and from the drawings, in which,

Figure 1 is a cross-sectional view taken through the longitudinal axis of a nozzle of this invention; and

Figure 2 is a view in cross section taken along line III—III of Figure 1.

In one kind of truck mixer which may be described but need not be illustrated, frame members suitably support a mixing drum with the rotational axis thereof in an inclined position parallel to the sides of the truck. A charging and discharging chute is provided at the upper end of the drum. The lower end of the drum is welded to a conical web which completes the dished lower end of the mixing drum. The web has a peripheral flange thereon outside said drum. The flange has affixed thereto a driven gear by means of which the drum is rotated. A pinion meshing with the gear is rotated at a suitable speed by means of conventional clutch and gearing connections to an engine mounted on the frame members.

The web also has a rearwardly projecting hub which is rotatably supported against a thrust bearing mounted on the frame of the truck. A hollow shaft 19 fits into the hub and is keyed thereto. The lowermost portion of shaft 19 constitutes a reduced neck portion of a male character which cooperates with a rotary pipe joint connected to the upper end of a water delivery hose. The pipe is connected through a connection to the outlet of a fast discharge type of centrifugal pump which is operated whenever water is required in the drum through the medium of a V-belt and pulley drive powered by the engine through its transmission. The pump is mounted on a hinged bracket to be tiltable by the operation of a cam lever, to slacken or tighten the V-belt and by this means to throw the pump into or out of operative engagement with the power unit for driving it. A water tank supplies water to the pump through a hose line. All of these parts and their operation are conventional in this type of equipment.

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The inlet nozzle of this invention comprises an inlet pipe 30 threadably engaging a corresponding tap in the upper end of shaft 19 and forming a continuation of the liquid passage from the outlet of the aforesaid pump through the aforesaid connection, pipe, joint and the center of shaft 19 which rotates as the drum turns. As shaft 19 revolves, pipe 30 and the other parts of the nozzle of this invention also revolve. The uppermost end 31 of pipe 30 constitutes the discharge end thereof. The edge 32 of pipe 30 at the discharge end is beveled in such a manner as to form a slight outward flare in the pipe for the purpose of improving the seating of a valve 33. In equally spaced relation around pipe 30 there are three longitudinally extending spacer bars 34 welded or otherwise affixed to the exterior of pipe 30. A cylindrical cap sleeve 35 is fitted over bars 34 and is bolted or otherwise fastened to such bars to hold cap sleeve 35 in spaced concentric relation relative to discharge end of inlet pipe 30. The interstices between spacer bars 34 and between pipe 30 and cap sleeve 35 form a re-entrant and substantially annular passage 36 which is a continuation of the passage through pipe 30. Water flowing through passages 36 leaves cap sleeve 35 at its discharge end 37 whence it expands an elastic tube valve 38 to enter the mixing drum.

The upper end of cap sleeve 35 is threaded for engagement with a cap piece 39 forming an end enclosure for cap sleeve 35 and pipe 30 and constituting with cap sleeve 35 a flow-reversing cap for the nozzle inlet. A sealing plate 40 is held against the machined edge of sleeve 35 in leak-proof fashion by set screws 41 threadably engaging tapped openings in cap piece 39. A stud bolt 42 having a screw head thereon is affixed to plate 40 by a nut 43, the clearance for which is obtained in the space between the outer side of plate 40 and the inner side of the end of cap piece 39. A necked portion 44 on stud bolt 42 passes through a corresponding opening in plate 40 with the result that bolt 42 is incapable of movement relative plate 40. Assembled on the shank of bolt 42 there are a spacing collar 45 and a washer 46 between which valve 33 is held. Valve 33 is made of rubber or other elastic or resilient material suitable for the purpose. It is a resilient disc which is held by virtue of the assembly on bolt 42 in normally closed position against the beveled edge 32 of pipe 30 so that surface seating or area contact is obtained, if desired, between valve 33 and edge 32. By varying the respective thicknesses of collar 45 and washer 46, this valve may be made of varying thickness and positioned as desired axially relative edge 32. In operation water flowing as shown by the dotted arrows through pipe 30 under the substantial pressure of pump 24 opens disc valve 33 and continues through into passage 36. When the water is shut off, valve 33 automatically reseats itself against edge 32.

Elastic tube 38 is made of rubber or other suitable material and constitutes a resilient sleeve valve which tightly grips the exterior of the discharge end 37 of cap sleeve 35 and the adjacent exterior of pipe 30. Since valve 38 is a continuous cylinder or tube, the portion intermediate the two portions which respectively bear on sleeve 35 and pipe 30 flares or assumes a frusto-conical outline. In addition, pressure in the mixing drum 11 instead of tending to open valve 38 presses valve 38 more tightly against pipe 30, over a substantial area of which valve 38 is in close

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gripping engagement because pipe 30 is slightly larger at least than the normal unstressed interior circumference of elastic tube 38. To prevent movement of valve 38, any suitable clamp may be employed such as hose clamp 47 having ears 48 through which a tightening bolt, lock washer and nut combination 49 are engaged.

In operation, discharges of water from pipe 30 open valve 33, pass through passage 36 and expand valve 38 outwardly away from pipe 30 so that the water can enter the mixing drum. When that water is shut off, valve 38 moves into close gripping engagement with pipe 30 and valve 33 closes the discharge end 31 of pipe 30. Hence, even though some gritty material should work its way in past the sealing engagement effected between discharges from the nozzle, such material will be confined to passage 36 because of the tight engagement of valve 33 against edge 32. Valve 33 is protected against any erosion, attrition or other deterioration by the cap assembly of sleeve 35 and cap piece 39 and by the normal closure position of valve 38.

Although I have illustrated and described a preferred practice and embodiment of the invention, it will be understood that changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A water inlet nozzle for a concrete mixer or the like, comprising in combination, an inlet pipe having a discharge end, a flow-reversing cap positioned over said discharge end in spaced relation thereto, said cap having a discharge end adjacent the exterior of said pipe, a resilient valve in the passage between said pipe and said cap adjacent the discharge end of said pipe, said resilient valve being normally in closure position in said passage and adapted to automatically open upon discharge through said pipe, and a resilient tubular sleeve positioned around said cap adjacent its discharge end and extending beyond said discharge end, said resilient sleeve being adapted to tightly grip said discharge end and the adjacent exterior of said pipe, said resilient sleeve being further adapted to automatically open and discharge from the discharge end of said cap.

2. A water inlet nozzle for a concrete mixer or the like, comprising in combination, an inlet pipe having a discharge end, a flow-reversing cap positioned over said discharge end in spaced relation thereto, said cap having a discharge end adjacent the exterior of said pipe, a resilient valve in the passage between said pipe and said cap adjacent the discharge end of said pipe, said resilient valve being normally in closure position in said passage and adapted to automatically open upon discharge through said pipe, a resilient tubular sleeve positioned around said cap adjacent its discharge end and extending beyond said discharge end, said resilient sleeve being adapted to tightly grip said discharge end and the adjacent exterior of said pipe, said resilient sleeve being further adapted to automatically open upon discharge from the discharge end of said cap, and a clamp adapted to press and hold said resilient sleeve against said cap, whereby said resilient sleeve may readily be replaced when it becomes worn.

3. A liquid inlet nozzle for use in a concrete mixing chamber or the like, comprising in combination, an inlet conduit adapted to extend into said chamber and having a discharge end there-

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in, longitudinal spacer bars affixed to the exterior of said conduit adjacent said discharge end, a flow-reversing cap sleeve fitted over said bars and affixed thereto, an end enclosure for said cap sleeve adjacent and beyond said discharge end, a resilient disc valve supported by said sleeve coaxially with said inlet conduit and in such spaced relation to said discharge end that said resilient disc valve normally closes said discharge end, said valve being of lesser diameter than said cap sleeve and of substantially the same diameter as said conduit, said inlet conduit being beveled at said discharge end to afford surface valve seating contact between said valve and said conduit, whereby said valve opens only upon discharge from said conduit and prevents any movement of material into said conduit through its discharge end.

4. A water inlet nozzle for use in a concrete mixer or the like, comprising in combination, an inlet adapted to project into said mixer or the like and having a discharge end below the top thereof, a cap sleeve arrangement fitted over said discharge end in spaced relation thereto and to said conduit and defining a reentrant discharge passage for said nozzle, said cap sleeve further defining an annular discharge opening for said nozzle at the discharge end of said cap sleeve, a resilient disc valve supported by said cap sleeve in normally closed relation against said discharge end of said inlet, said disc valve being adapted to open only upon discharge through said inlet, and a cylindrical resilient sleeve having a portion expanded to fit over and around said discharge end of said cap sleeve and having another portion projecting therebeyond, said latter portion being expanded to fit snugly around the adjacent exterior of said inlet.

5. A liquid inlet nozzle for use in a concrete mixer or the like, comprising in combination a tubular inlet pipe having a discharge end, a flow-reversing cap covering said discharge end and positioned in concentric telescoped relation

to said pipe around the exterior thereof, a resilient disc valve within said cap, said valve being supported by said cap in normally closed relation across the discharge end of said pipe, said valve being adapted to open under the impact of the pressure of liquid when passing through said pipe, an elastic tube valve surrounding said cap at the discharge end thereof and extending therebeyond, said portion of said elastic tube valve extending beyond said discharge end of said cap gripping said pipe with the inner surface of said elastic tube valve and adapted to be opened under the impact of the pressure of liquid when passing through said pipe and cap.

6. A water inlet nozzle for a concrete mixer or the like, comprising in combination, an inlet conduit having a discharge end, a cap having a portion positioned over said conduit discharge end and a portion extending around said conduit with a flow-reversing passage through the cap and an outlet opening for said passage adjacent the outside of the cap, a resilient disc valve normally closing said discharge end of the conduit, said disc valve being mounted for opening yieldably to discharge flow from the conduit and for closing unyieldably against back-flow into the conduit, and a resilient sleeve valve extending tightly around said nozzle and tightly covering the outlet opening of the cap to oppose back-flow into the opening while yieldably allowing outflow from the opening, whereby said valves prevent the passage of material into the conduit when the conduit is not discharging.

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