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O. JACOBSEN

1,637,697

MIXING NOZZLE

Filed March 7, 1927

Fig. 1.

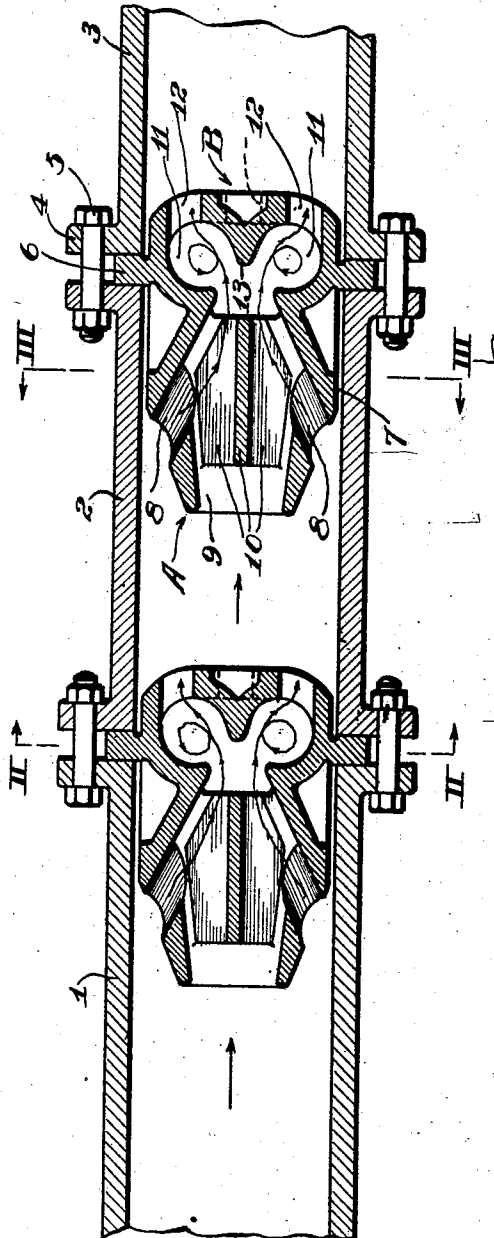


Fig. 4.

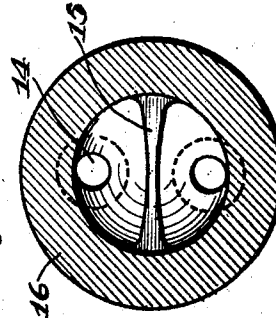


Fig. 3.

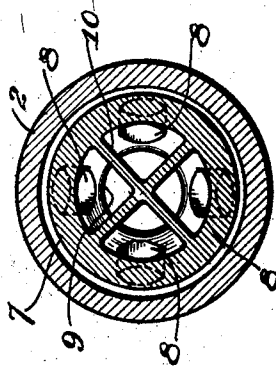
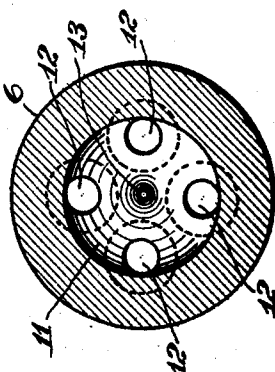


Fig. 2.



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MIXING NOZZLE.

Application filed March 7, 1927. Serial No. 173,309.

The invention relates to mixing nozzles, and particularly to nozzles for use in mixing oil with acid, although the nozzle is useful in other relations, wherein it is desirable to secure the intimate mixture of two or more liquids as they pass through a conduit. In the treatment of oils with acid, alkalies, or other chemicals to remove sludge and impurities, it is necessary to secure a very intimate mixture of the oil and acid before they receive their alkaline treatment to neutralize the acid, and the present invention has for its primary objects the provision of a simple nozzle construction which will give a very thorough mixing of the oil and acid. One embodiment of the invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a vertical section through a pipe with two of the mixing nozzles mounted therein. Figs. 2 and 3 are sections on the lines II—II and III—III of Fig. 1. And Fig. 4 is a section through a modified construction.

Referring to the drawing, 1, 2 and 3 are pipe sections provided with opposing pairs of flanges 4, 4 secured by the bolts 5. Two of the mixing nozzles are shown, but it will be understood that any number may be used in series, or that a single one may be used, depending upon requirements.

The nozzles are cast of any suitable material, preferably of high corrosion resisting composition, such as high silicon iron, or a copper, aluminum, iron alloy, such as that known under the trade name of "Alcumite". The casting comprises what may be termed an inlet portion A and a mixing portion B with a flange 6 clamped between the pair of opposing pipe ends.

The inlet portion A fits easily in the pipe at 7, and rearward therefrom tapers to the left, as shown, with the inclined inlet passages 8, 8 and a central passage 9. Interiorly the inlet passage tapers to the right, leading at its reduced forward end into the mixing portion B. A pair of partitions 10 divide the main inlet passage into four parts, as indicated in Fig. 3.

The mixing portion B consists of a cavity 11 having its front wall provided with the four openings 12, 12, 12, 12 (Fig. 2), the central portion of such wall being provided with the cone 13.

The fluids to be mixed, flowing to the right through the pipes 1, 2 and 3, enter the openings 8 and 9, and are broken into a plurality of streams by the partitions 10, 10 (Fig. 3), which are brought together in the tapering forward end of the inlet passage, and discharged into the cavity 11 at an increased velocity. Four streams are formed at this point, due to the partitions 10, 10 and these streams, projected into the cavity are given a violent swirling motion in the direction of the arrows. The liquids, as thus mixed, are then discharged through the openings 12 at a high velocity, this tending to still further mix the liquids, as the four streams come together. The nozzles by thus repeatedly changing the velocity and direction of movement of the liquids cause a very intimate mixing thereof.

Fig. 4 is a section through a modified nozzle 16 on a line corresponding in location to the line II—II of Fig. 1. This nozzle is like that of Figs. 1 to 3, except that the front wall of the mixing chamber is provided with only two openings 14, 14 instead of the four openings 12, 12, 12, 12 of the Fig. 1 construction, and except that the wedge 15 is substituted for the cone 13 of Fig. 1. In the longitudinal section, this nozzle is substantially the same as that shown in Fig. 1. The nozzle is capable of other modifications without departing from the broad invention involved.

What I claim is:

1. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and having a mixing portion into which the reduced end of such inlet portion discharges, said mixing portion comprising a cavity having a forward wall, the central part of said forward wall being in line with said reduced end and imperforate and with outlet passages outward from such central part.

2. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and having a mixing portion into which the reduced end of such inlet portion discharges, said mixing portion having a forward wall in line

with the center line of said reduced end provided with a cone for deflecting the fluid outwardly from said center line, and said wall also being provided with a plurality of discharge openings surrounding said cone.

3. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and having a mixing portion into which the reduced end of such inlet portion discharges, said mixing portion comprising a cavity having a forward wall in line with said reduced end provided with a member of wedge cross section, and also provided with a plurality of outlet passages outward from said member.

4. The combination with a pipe having opposed flanged ends and means for securing them together, of a nozzle in the pipe having a flange clamped between said flanged pipe ends, and having an inlet portion tapering inward in the direction of flow of the liquid and a mixing portion comprising a cavity with a front wall having an imperforate central portion and with outlet passages outward of said central portion.

5. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and having a mixing portion into which the reduced end of such inlet portion discharges, said mixing portion comprising a cavity with a front wall having an imperforate central portion and with outlet passages outward of said central portion and said inlet portion

having its rearward exterior surface tapering to the rear and having a central inlet passage and a plurality of inclined inlet passages leading from said exterior surface to said inlet passage.

6. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and having a mixing portion into which the reduced end of such inlet portion discharges, said mixing portion comprising a cavity with a front wall having an imperforate central portion and with outlet passages outward of said central portion, and said inlet, intermediate its ends, having the exterior surface in proximity to the interior of the pipe, and having such exterior surface tapering to the rear and having a central inlet passage and a plurality of inclined inlet passages leading from said exterior surface to said inlet passage.

7. The combination with a pipe through which fluids to be mixed are circulated, of a nozzle mounted in the pipe having an inlet portion with its passage tapering inwardly in the direction of flow of the fluid, and provided with central dividing partition means and having a mixing portion comprising a cavity with a front wall having an imperforate central portion and with outlet passages outward of said central portion.

In testimony whereof, I have hereunto subscribed my name this 3rd day of March, 1927.

O. JACOBSEN.