

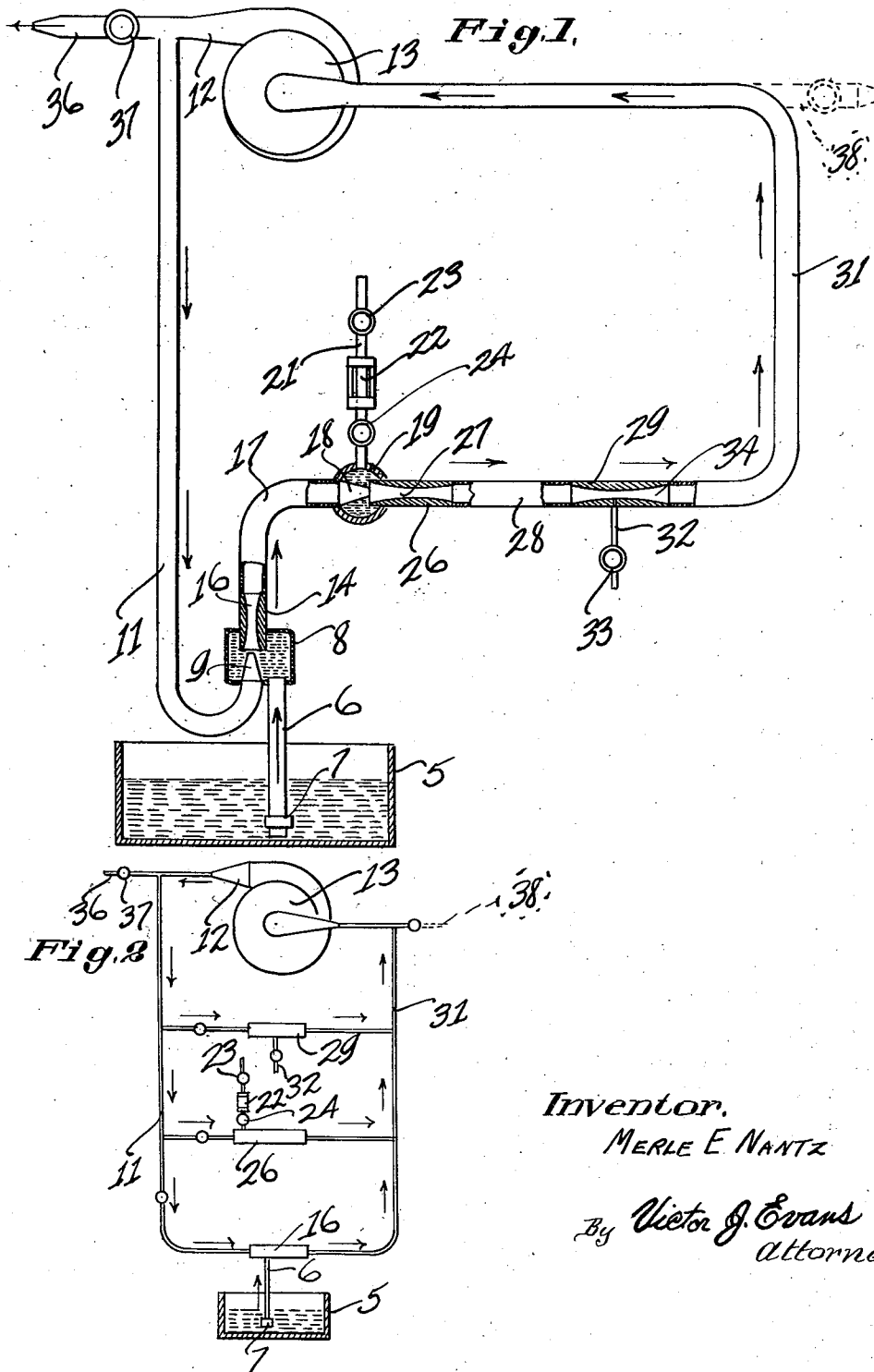
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MIXING DEVICE

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MIXING DEVICE

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This invention relates to improvements in mixing devices and has particular reference to means for mixing liquids or liquid and air.

The principal object is to provide a device for mixing oil and water or oil, water and air and supplying this mixture to a burner or like device.

Another object is to provide a device whereby greater discharge pressure can be obtained from a given pump and a device which is easy to manipulate and simple in construction.

A further object is to utilize but a single pump element for pumping both the liquid and air.

A further object is to provide means whereby the pump may operate at a greater capacity than that required for the burners.

A still further object is to provide means whereby a very perfect combining of the liquid and air is accomplished thus making a more combustible fluid.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawing forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a diagrammatic illustration of my invention, and

Figure 2 is a diagrammatic illustration showing the injectors operating in parallel.

In the handling of oil and similar fluids for use in oil burning plants, it is essential that the pressure at the nozzle should remain uniform at all times. It is also well known that oil which is mixed with a small portion of water will give a better combustion than oil alone. It is also well known that addition of air to the mixture will also increase the efficiency of the burning fluid.

I have therefore provided a device which will accomplish all of these objects, and by referring to the drawing, the numeral 5 designates a tank in which the oil supply is stored and into which a pipe 6 extends. This pipe is provided with a foot valve 7 and has its upper end terminating in a small receptacle 8. Within the receptacle 8 is nozzle 9 which nozzle is connected to a pipe 11 which is in turn connected to the outlet 12 of the pump 13. The pump 13 is preferably of the rotary type. A Venturi tube 14 is secured in the receptacle 8 and has its opening 16 in alignment with the nozzle 9. A pipe 17 is connected to the venturi 14 and terminates in a nozzle 18 within a receptacle 19. This receptacle is adapted to receive water from the pipe 21 within which a sight glass 22 is provided.

Valves one of which is a check valve are shown

at 23 and 24 to regulate the water passing to the receptacle 19. A Venturi tube 26 is secured to the receptacle 19 and has its opening 27 in alignment with the nozzle 18. A pipe 28 connects the Venturi tube 26 to a similar Venturi tube 29 the opposite end of which is connected by a pipe 31 to the pump 13. A pipe 32 provided with a valve 33 admits air or gas to the passage 34 of the Venturi tube 29. The structure thus far described completes the circulation system to which a burner 36 may be secured and controlled by a valve 37. An alternate position of the burner is shown in dotted lines at 38.

The operation of my device is as follows:—

Assuming that the pump 13 is being driven, 15 the contents of the pump will pass as indicated by the arrows adjacent the pipe 11 to the nozzle 9 from which nozzle the jet issuing therefrom will pass into the Venturi opening 16 with the result that the fluid in the receptacle 8 will pass into the jet stream and consequently more oil will be drawn into the receptacle 8 from the tank 5. When the system is shut down, the foot valve 7 will prevent the fluid in the receptacle 8 from returning to the tank 5 and will thus keep the entire system primed at all times. The fluid passing through the pipe 17 will be discharged from the nozzle 18 into the Venturi opening 27 and at this point the jet will pick up the water within the receptacle 19 and as the fluid passes on to the next Venturi tube air or gas will be likewise drawn into the fluid stream with the result that when the fluid reaches the pump 13 it will consist of oil, water and air or gas which will be intimately mixed due to the mixing action taking place between the high velocity stream passing from the nozzle to the Venturi and the expanding to a slower velocity after passing therethrough. This mixing action is well known and needs no further comments. Any tendency for separation of the elements of the stream will be prevented by further action of the pump 13 which will have a churning or emulsifying tendency.

It will thus be seen that with this arrangement it is possible for me to pick up oil from a distance greater than can be possibly lifted by an ordinary suction pump, and to deliver the oil together with water, air or gas to any desired point and to maintain an even pressure in the system.

In Figure 2 the parts are identical with the exception that instead of having the various injectors in series they are placed in multiple. The injectors in this instance are given the same numerals as those in Figure 1.

From the above description and particularly

the disclosure of the drawing it will be obvious that I employ a closed pressure circuit for the fluid stream of my mixer, with means for introducing the various fluids therein, the said means
5 being in fact jet pumps in and forming a part of the circuit.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size,
10 shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention I claim:—

15 1. In a mixing device comprising a closed pressure circuit including a pump, an injector receiving fluid from said pump, means for delivering a fluid around said injector for entry into the fluid stream of the circuit, a second injector,
20 means to deliver the fluid stream from the first injector to the second injector, means to introduce a second fluid into the fluid stream around said second injector, and means for conducting said fluid stream to the pump.

25 2. In a mixing device, a closed pressure circuit, pumping means in said circuit, a plurality of jet pumps in said circuit and disposed one in advance of the other, and individual means for delivering various kinds of fluids in said circuit through
30 the medium of the jet pumps.

3. In a mixing device, a closed pressure circuit, pumping means in said circuit, a plurality of jet pumps in said circuit and disposed one in advance of the other, individual means for delivering fluid in said circuit through the medium of the jet pumps, and means for removing fluid from said circuit through the pumping means.

4. In a mixing device, a closed pressure circuit, pumping means in said circuit, a plurality of jet pumps in said circuit, a plurality of means for delivering various kinds of fluids at spaced intervals in the circuit and including the jet pumps, and one of said means disposed between the pumping means and a jet pump.

5. In a mixing device, a closed circuit, pumping means in said circuit, a plurality of injectors in said circuit, individual means for introducing fluids at intervals in said circuit about said injectors, means for introducing fluid in said circuit between one of said injectors and the pumping means to commingle with the fluids from the first mentioned means, and means for removing the commingled fluids from the circuit through the pumping means.

6. In a mixing device, a closed circuit, a pumping means in said circuit, a plurality of injectors in said circuit, a closed receptacle for each injector and surrounding the same, individual means

for delivering fluid to each receptacle, means for introducing fluid in said circuit between one of said injectors and the pumping means to commingle with the fluids from the injectors, and means for removing the fluids from the circuit through the pumping means.

7. In a mixing device, a closed circuit, receptacles in said circuit, individual means for delivering fluid to each receptacle, nozzles in said circuit and extending into the receptacles, Venturi tubes in said circuit and some of said tubes extending into the receptacles and being aligned with the nozzles, means for delivering fluid to another of said Venturi tubes, pumping means in the circuit and means for removing fluid from
15 the circuit through the pumping means.

8. In a mixing system, a closed pressure circuit, pumping means in said circuit, a plurality of jet pumps in said circuit, means for conveying mixed fluid from said pumping means to said jet pumps,
20 means for conveying component fluids from individual sources to each of said jet pumps for introduction into the fluid stream of said closed circuit, and means for returning the mixed fluid to the pumping means.

9. In a mixing system, a closed pressure circuit, pumping means in said circuit, a plurality of jet pumps in said circuit, means for conveying mixed fluid from said pumping means to said jet pumps, means for conveying component fluids from individual sources to each of said jet pumps for
30 introduction into the fluid stream of said closed circuit, means for returning the mixed fluid to the pumping means and means for removing the mixed fluid from the fluid stream.

10. In a mixing system, a closed pressure circuit including a pumping means, a group of jet pumps in said circuit, means for conveying mixed fluid from said pumping means to said group of jet pumps, means for conveying component fluids from individual sources of supply to each jet pump of said group for introduction into the fluid stream of the closed circuit, and means for returning the mixed fluid from said group of jet pumps to the pumping means.

11. In a mixing system, a closed pressure circuit including a pumping means, a group of jet pumps in said circuit, means for conveying mixed fluid from said pumping means to said group of jet pumps, means for conveying component fluids from individual sources of supply to each jet pump of said group for introduction into the fluid stream of the closed circuit, means for returning the mixed fluid from said group of jet pumps to the pumping means, and means for removing the mixed fluid from the fluid stream.

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