

April 1, 1958

M. M. P. R. DE LA FOURNIERE
MEANS FOR DIFFUSING A FLUID IN A FLOW
OF GASEOUS FLUID

2,828,951

Filed June 2, 1952

2 Sheets-Sheet 1

Fig. 5

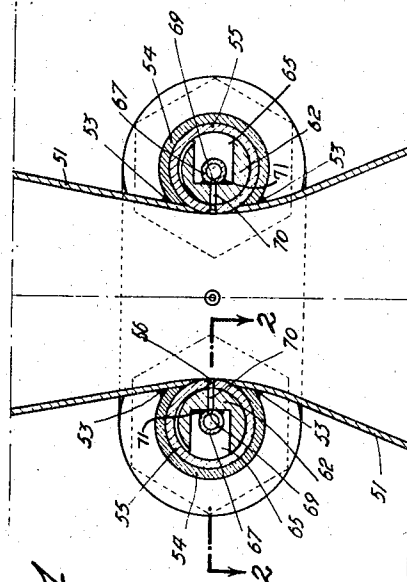
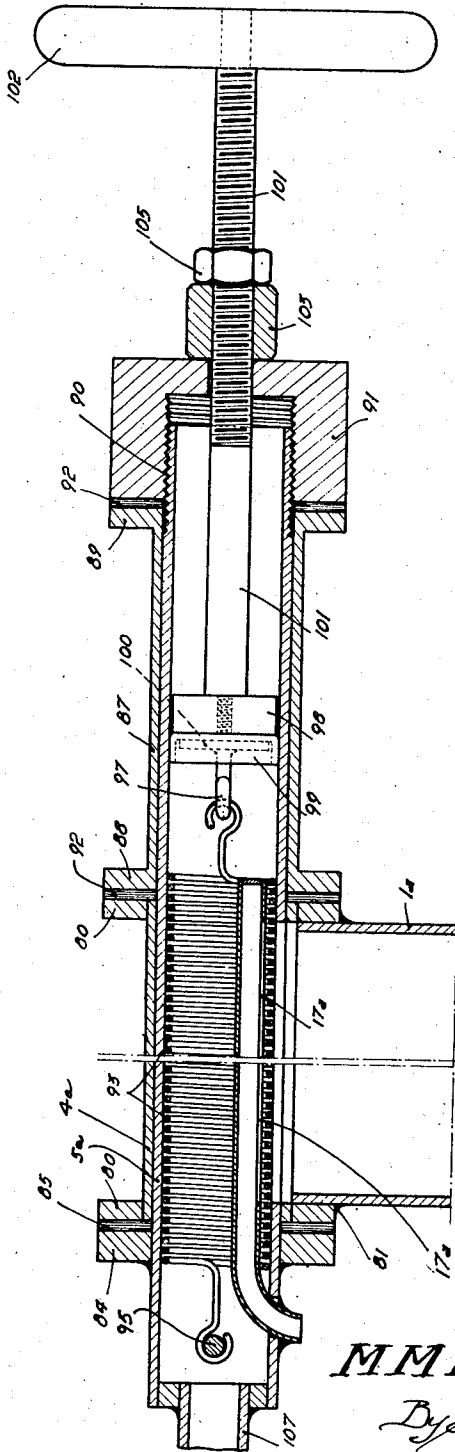


Fig. 1

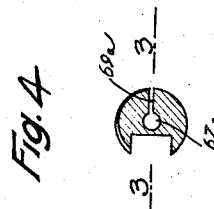
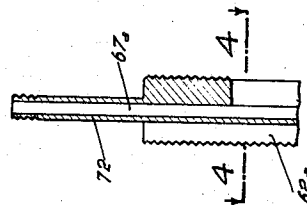


Fig. 4

Fig. 3



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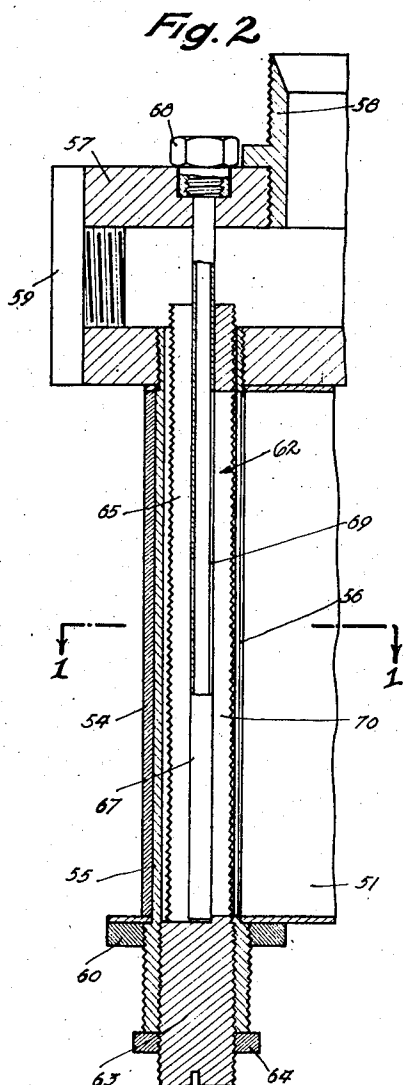
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MEANS FOR DIFFUSING A FLUID IN A FLOW OF GASEOUS FLUID

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Application June 2, 1952, Serial No. 291,082

Claims priority, application France June 5, 1951

8 Claims. (Cl. 261—16)

The present invention relates to means serving to diffuse a fluid throughout a mass of moving gaseous fluid in a thorough manner.

An object of the invention is to provide an assembly which is simple and inexpensive to manufacture and the cleaning of which can be accomplished quickly and easily.

Another object of the invention is to provide an assembly wherein the direction in which the fluid is diffused can be adjusted easily.

With the above and other objects in view, the present invention comprises a tube having at least one longitudinal slot in close contact with means extending throughout the length of the slot, a plurality of small channels at right angles to the slot, the channels being arranged in at least one of the contact surfaces of the tube and said means, and a liquid fed into the tube passing through the channels to the slot through which the liquid escapes.

It is especially advantageous and simple to form the means extending throughout the length of the slot as a spiral spring which is preferably located within the tube.

The invention will be readily understood from the ensuing description of certain embodiments when considered in conjunction with the attached drawings, in which:

Fig. 1 is a sectional view taken along the line 1—1 of Fig. 2, the view looking in the direction of the arrows.

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1, the view looking in the direction of the arrows.

Fig. 3 is a sectional view of the assembly shown in Fig. 4, the view being taken along the line 3—3 of Fig. 4.

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3, the view looking in the direction of the arrows, and

Fig. 5 is a cross-sectional view of an alternative embodiment of atomizing assembly.

Referring to Figs. 1 to 4 inclusive, it will be seen that each of the outer surfaces of a Venturi tube 51 is provided with an opening adjacent the throat, and a socket 54 is welded at 53 to the outer face of each of the surfaces on opposite sides of the opening. The socket 54 extends throughout the length of the opening so as to re-establish, so to speak, the line of the Venturi wall. The wall of the socket is folded over between the two spaced welds 53 whereby the interior of the socket 54 communicates with the interior of the Venturi tube 51.

A tube 55 is inserted in each of the sockets 54 and the tube is provided with a longitudinal slot 56 and the edges of the slot flare outwardly toward the outside of the tube and extend throughout the length of the outer surfaces of the Venturi tube as can be seen in Fig. 2. The tube 55 projects at each end beyond the socket 54 and one of the projecting ends is of lesser diameter than the remainder of the tube and such end is screwed into an aperture in a casing or distributor 57 provided with an inlet nozzle 58 (Fig. 2). To permit access to the interior of the casing 57, a plug 59 is threaded into an opening in one side of the casing, and upon the removal of the plug, the casing can be cleaned, if necessary.

The other projecting end of the tube 55 is of slightly

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greater outer diameter and is externally threaded to receive a nut 60 and when the nut is drawn up, the casing 57 will be pressed against the opposite end of the socket 54.

A threaded rod 62 is inserted into the latter projecting end of the tube 55 and the outer diameter of the rod is substantially equal to the inner diameter of the tube 55 with the exception of a slightly larger head portion 63 which is externally threaded to cooperate with the internal threads of the bore of the projecting end of the tube. A lock nut 64 is positioned beneath the projecting end of the tube on the head portion for the customary purposes.

The rod 62 is formed with a longitudinal groove 65 of a length to communicate with the interior of the casing 57 and the entire length of the slot 56 of the tube 55.

A cylindrical tube 67 is located within the groove 65 of the rod and extends throughout the length of the groove with the lower end of the tube inside the rod being sealed. The opposite or upper end of the tube projects beyond the end of the rod 62, passes through the casing 57 and terminates in a stuffing box 68 associated with the casing wall. If necessary, the upper end of the tube 67 can be provided with a joint means (not shown) for connecting a feed conduit for air or gas under pressure thereto.

Within the rod 62, the tube 67 is provided with a longitudinal slot 69 opposite the slot 56 in the tube 55 and a slot 70 is formed in the rod 62 between the slots 69 and 56. The tube 67 preferably is welded to the rod 62 on opposite sides of the slots 69 and 70 as indicated at 71, but, the tube can be freely mounted within the groove 65 to enable the same to be removable separately from the rod 62.

It is believed apparent that the liquid under pressure entering through the intake nozzle 58 will enter the groove 65 which feeds in parallel all of the grooves between threads intercepted thereby whereby the liquid circulates around all such grooves and escapes through the slot 56 whenever a groove between threads and the slot 56 are even with each other. By screwing the tube 55 more or less tightly in the casing 57, the orientation of the slot and as a consequence, the direction of the jets is varied. It is possible to adjust the tube 55 without difficulty so that the jets emanate from the slot in a direction having a component opposite to the direction of flow of the gaseous stream in the Venturi tube. It is further possible to obtain this variation in the orientation of the jets, even if the tube 67 is not present or the tube 67 is freely mounted within the rod 62 by the angular displacement of the groove 65 relative to the slot 56 by rotation of the rod 62 within the tube 55. In this latter situation, each jet takes a direction having a component directed towards the slot where the longest circumferential channels are located between the slot and the groove 65.

It will be appreciated that this very simple atomizing device involves no risk of becoming clogged and, in certain situations, it is necessary to clean the same, this can be accomplished by unscrewing the rod 62 and cleaning the same together with the interior of the tube 55 which can be quickly effected.

In an alternative form illustrated in Figs. 3 and 4, the tube 67 is replaced by a channel 67a formed in the body of the rod 62a per se and the longitudinal slot is denoted 69a. The latter terminates in a cylindrical extension 72 which performs the same function as the tube 67 passing through the casing 57 and terminating in the stuffing box 68.

It will be further appreciated that the groove 65 instead of being located entirely in the rod 62 could be arranged partly in the rod and partly in the tube 55 or, if the tube 55 was of substantial thickness, the groove could be fully formed therein. The tube could be spiral in lieu of being straight and there could be several, distributed about the periphery, provided that none of the

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grooves are level with the slot 56. The tube 55 could further be provided with two or more parallel or divergent slots and atomizing devices of the character set forth can be arranged within the Venturi tube at right angles to its axis.

In the modification illustrated in Fig. 5, the Venturi tube 1a is of the type previously described and on either side of the outer surfaces of the tube in line with the throat, a socket 4a, the axis of which is at right angles to that of the Venturi tube is provided. Each socket 4a projects slightly beyond the outside of each of the small surfaces of the Venturi tube and is provided at the ends thereof with flanges 80 which are welded at 81 to the small surfaces of the tube. Each of the sockets is formed with a longitudinal slot throughout the length of the large side of the Venturi tube whereby the space within the socket is in communication with the interior of the Venturi tube.

Inside each socket 4a, a tube 5a threaded at one end is inserted and the ends of the tube 5a project a substantial distance beyond the socket, with the tube 5a being slotted longitudinally similar to the socket. Adjacent one end, the tube 5a is provided with a collar 84 in parallelism to one of the flanges 80 and a joint 85 is positioned between the collar and the flange.

A sleeve 87 having flanges 88 and 89 at the ends thereof is located over the other end of the tube 5a and a ring 91 is threaded onto the threaded end 90 of the tube 5a. The ring 91 presses the sleeve 87, and more particularly the collar 88 against the flange 80 of the socket 4a and a joint 92 is positioned between the collar 88 and the flange 80 and between the flange 89 and the end of the ring 91.

A spiral spring 93 is fitted tightly within the tube 5a, with the spirals of the spring substantially touching each other and the outer diameter of the spring being substantially the same as the inner diameter of the tube. The spring 93 extends over a greater length of the tube 5a than that of the longitudinal slot in order that there can be no communication between the interior of the tube and the interior of the Venturi tube other than through the space between the various convolutions of the spring 93.

Each extremity of the spring 93 terminates in a hook and one of the hooks engages a bar 95 disposed across the tube 5a and fixed to the tube in proximity to the end provided with the collar 84. The other hook engages an eye 97 threaded in a head 98 slidable within the tube 5a and carrying a sealing joint 99 maintained against the head by base 100. The head 98 is provided with an axially extending rod 101 which passes freely through a central aperture in the ring 91 and a handle 102 is attached to the outer end of the rod 101. A nut 103 is threaded onto a threaded portion of the rod outside of the ring 91 and by means of locknut 105, the nut 103 can be secured in any desired position on the rod.

Obviously, any displacement of the nut 103 which constitutes a shoulder stop against the ring 91 causes the tension of the spring 93 to vary and also effects a change in the space between the convolutions of the spring with a resultant variation in the flow of the atomized fluid to the throat of the Venturi tube.

The other end of the tube 5a is sealed and a tube or conduit 107 which feeds the fluid to be atomized communicates with the interior of the tube 5a. An atomizing air feed conduit 17a is located at the same end of the tube 5a and the tube 17a is in communication with the interior of the tube and the conduit can be formed of copper piping slit longitudinally, with the conduit being located within the spring 93.

This assembly is especially efficacious in that it is easy to adjust the flow of the atomized fluid by varying the spring tension and as a consequence the space between the convolutions. In addition, traction can be exerted on the spring by the handle 102 and the same has the effect of cleaning the interior of the tube.

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Aside from the form of the invention adopted, the uses and applications of the invention are innumerable. In particular, several liquids suited to the nature of the gaseous particles, liquid, solid or even living (microbes) to be eliminated from the mass of gases to be treated, can be sprayed over the same. Water can be used with the addition of wetting agents, lowering the tension or use can be made directly of certain liquid or gaseous products serving to react chemically on the particles to be eliminated, or to give the mass of gas to be treated certain specific properties.

Furthermore, the invention can be used for the selective separation of mixed gaseous fluids, either by the method of selective dissolution or by that of a chemical reaction. In certain special situations, the various components of the assembly must be made of a material capable of withstanding physical or chemical attacks by the gas treated or the particles to be separated, or the components should be coated with such material. This is particularly true in the case of radio-active particles in which situation, the components should be coated with lead or some other material which functions as a screen against radio-active rays.

The invention can also be used to incorporate thoroughly in the gaseous mass treated at least one gaseous fluid or a vapor, such as water vapor.

The invention is not to be confined to any strict conformity with the showings in the drawings since changes and modifications can be made therein by one skilled in the art provided such changes or modifications mark no material departure from the spirit and scope of the appended claims.

What I claim is:

1. In means for diffusing a fluid in a flow of gaseous fluid within a main duct which comprise at least one tube adapted for circulation therethrough of said fluid to be diffused and provided with at least one longitudinal slot opening into said main duct, and a cooperating member in contact with the wall of said tube on each side of said slot along the whole length thereof, said cooperating member being provided on its lateral surface with numerous narrow grooves extending transversely to said slot and in communication with at least one inlet channel for the fluid to be diffused thereby providing a plurality of passages through which jets of said fluid issue and stretch a sheet across said duct over the whole cross-section thereof.

2. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 1 wherein said numerous narrow grooves are defined by a continuous helical groove so that successive parts of the groove opposite the slot provide the plurality of passages.

3. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 2 wherein a conduit is positioned within and along said tube and projecting out of the tube, the part of the conduit located within the tube being provided with apertures to allow communication between the interior of the conduit and the interior of the tube whereby two different fluids may be fed to the slot in the tube, one fluid being fed by and through the tube and the other fluid through the conduit and through the slot into the main duct.

4. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 1 wherein said cooperating member consists of a tubular conduit, with the numerous narrow grooves being formed in the periphery of the tubular conduit.

5. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 4 wherein said narrow grooves are defined by an external screw thread.

6. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 1 wherein said cooperating member is defined by a spiral spring, with the space between adjacent convolutions of the spring providing the narrow grooves.

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7. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 6 wherein means is provided to vary the tension of the spiral spring.

8. In means for diffusing a fluid in a flow of gaseous fluid as claimed in claim 7 wherein one end of the spiral spring is fixed within the tube, a head slidably mounted within the tube, means connecting the other end of the spring to the head, and a manually operable means exteriorly of the tube connected to the head within the tube to slide the head, the head and manually operable means constituting the means to vary the tension of the spring.

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