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APPARATUS FOR ATOMIZING FLUIDS

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Fig. 1

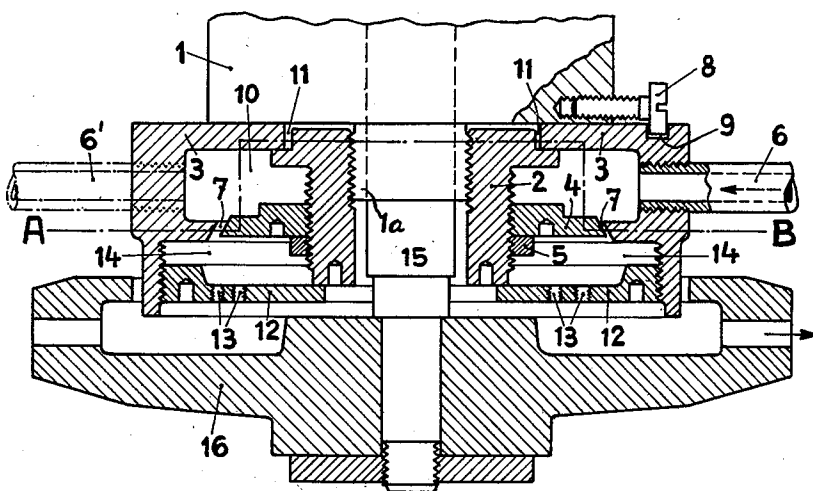
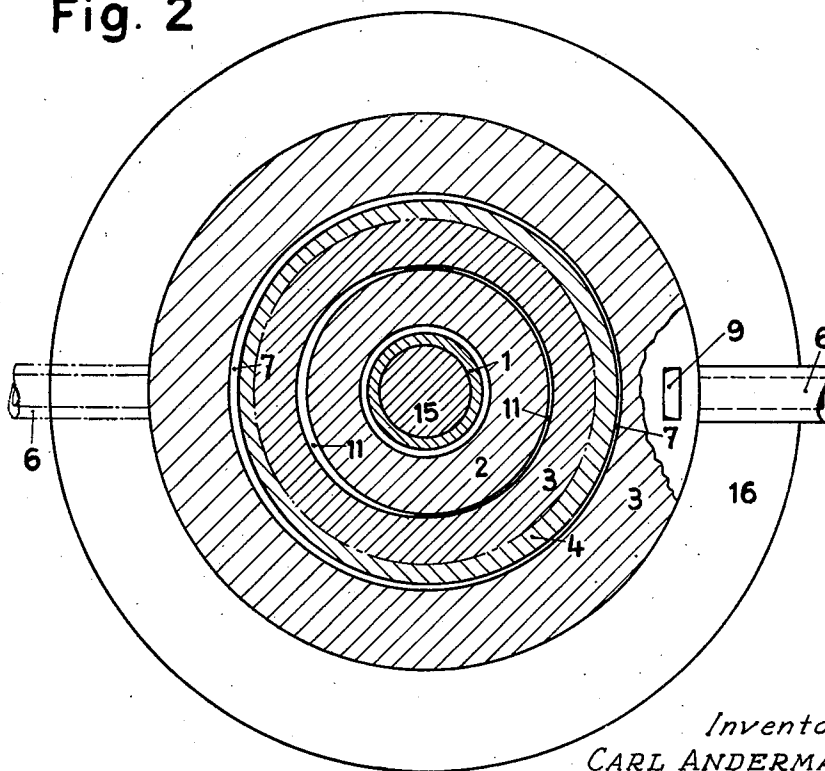


Fig. 2



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APPARATUS FOR ATOMIZING FLUIDS

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5 Claims. (Cl. 299—63)

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This invention relates to apparatus for atomizing fluids.

Processes and appliances are already known in which a central inlet to the atomizer disc is provided. Devices are also known in which the inlet tube ends directly in a distributing chamber, or in a ring-shaped collector, from which the fluid is delivered on to the atomizer or spray disc by means of a number of discharge channels.

According to the present invention, the inflowing fluid is first divided in a non-rotating pre-chamber, out of which it is delivered at several points in practically equal quantities to uniform sectors of a non-rotating distributing chamber. From here it is fed on to the atomizer or spray disc in several continuously flowing part streams distributed over the sections to be supplied, under an equalized pressure which is lower than the pressure in the undivided inflow. A reduction and part balancing of pressure can suitably be effected at the inlet into the pre-chamber, by increasing for this purpose the section of the fluid stream. The quantity of fluid flowing from the pre-chamber into the distributing chamber can be brought into correspondence with the desired capacity of the atomizer disc by regulating the pressure and the cross-section of the already divided fluid stream flowing out of the one chamber into the other. The outflow from the distributing chamber can be largely regulated by controlling the outflowing speed, the cross-sections of the outflowing streams remaining unchanged. For this purpose, in accordance with the particular conditions prevailing in each case, as for instance degree of viscosity, etc., it is advisable to establish and keep up in the distributing chamber, by reducing or increasing the outflows, such a static head of the fluid that it will only flow out of the distributing chamber under its own pressure as governed by the corresponding height of liquid. At higher degrees of viscosity it may become necessary—in order to secure a sufficient speed for the outflow from the distributing chamber—to keep the fluid contained therein under a suitable pressure, by means of the fluid stream pressing on from the pre-chamber.

Various fluids can be fed into the pre-chamber, so as to be gradually mixed together on their further common way.

A constructional example of realisation of a device suitable for applying the process is schematically represented on the attached drawing. On this drawing:

Fig. 1 shows an axial section;

Fig. 2—a section along the line A—B in Fig. 1.

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The fluid inlet tube 6 ends at any desired point in the pre-chamber 10, the cross-section of which should suitably exceed that of the inlet tube, so as to secure a first reduction of pressure combined with a part equilization of pressure shocks. A second inlet tube 6' enters the pre-chamber preferably at a point opposite the inlet tube 6 as illustrated. It is provided for the purpose of carrying another fluid to be mixed and sprayed together with the first fluid, but may be omitted if only one fluid is to be atomized.

The pre-chamber may have any desired shape. In its simplest form it can consist of a tubular branching, the several branches of which lead to the distributing chamber 14 at suitably selected points. The most suitable design is a fixed ring-shaped chamber 10, arranged in some measure concentrically to the shaft 15 carrying the atomizer disc 16. In the constructional example shown here the ring-shaped chamber is constituted by a base ring 2 seated on the threaded trunnion or bushing 1a of the carrier plate 1, a casing 3 pressed by the base ring 2 against the carrier plate 1, and an adjusting disc 4.

The distributing chamber 14 is also designed as a closed ring-shaped chamber, arranged in some measure concentrically to the shaft 15 of the atomizer disc, and constituted by a projection of the casing 3, a ring-shaped disc 12 and the base ring 2. The distributing chamber 14 is separated from the pre-chamber 10 by the adjusting disc 4. A number of ports 13 arranged in known manner in rows, of which part are fitted with threads and can be blocked as required by means of screws, enable the fluid to pass from the distributing chamber on to the areas on the atomizer disc where it is to be fed. Both the pre-chamber and the distributing chamber can be subdivided into compartments with separate feed pipes, for taking up different fluids to be fed separately on to the atomizer disc, or else have a shape differing from the ring shape.

In any case, the fluid is fed from the pre-chamber into the distributing chamber 14 at various points, the cross-sections and the connecting ports being selected in such a manner that within a given time unit approximately uniform quantities shall flow through each sector, so as to have the total quantity fit the desired capacity of the atomizer disc. A particularly good uniformity is secured by combining the ports provided between pre-chamber and distributing chamber into a ring-shaped slot 7. Where at least one of the limiting faces facing this slot is bevelled after the manner of a cone stump, it is

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possible to modify simultaneously and continuously the slot width on the whole slot length, so as to adjust it to fluctuating requirements, by simply displacing axially the adjusting disc 4 and locking it by means of locking ring 5 in relation to the casing 3.

In the case of one-sided peripheral feeding to the pre-chamber, and consequently varying local pressures in the chamber, in order establish and maintain approximately uniform fluid flow over the entire length of the slot 7, the slot is given a varying width, the widest places naturally occurring in those places in which the pressure in the pre-chamber is lowest. This irregularity in the slot width is secured, for instance, by displacing radially in relation to the adjusting disc 4 the axially non-displaceable casing part 3. The measure of eccentricity, and consequently also of the differences in slot width, can be adjusted by means of adjusting screw 8 engaging the notch 9, or by other similar arrangements according to requirements, within the limits set by the clearance slot 11.

In accordance with the relation set in this manner between the cross-section of inflow and outflow, and the degree of viscosity, a greater or lesser height of liquid will be established in the distributing chamber. This height can be less than the height of the distributing chamber. In this case, the fluid discharged through the ports 13 will only stand under its own pressure as governed by the height of liquid, and consequently a further equalization of pressure will take place in the distributing chamber. The distributing chamber, on the other hand, can also be completely filled with fluid, the consequence being that this fluid will stand under a pressure arising out of the fluid pressing on from the pre-chamber. This may be more particularly necessary where fluids with a high degree of viscosity have to be dealt with, in order to secure a sufficiently rapid discharge towards the atomizer disc.

The appliance described above makes possible such a regulation of the fluid streams that the fluid is fed from the distributing chamber to the atomizer disc in several partial streams suitably distributed and flowing continuously under an equalized pressure, kept as low as possible. This equalization of feeding enables the capacity of the atomizer disc to be permanently utilized to the full. Marked variations in flow with their attendant disadvantages are avoided by the provision of a plurality of ports 13 uniformly distributed with respect to the discharge openings of the atomizing disc 16 which receive the fluid at substantially constant pressure. The same appliance can be used for feeding to the atomizer disc fluids of all degrees of viscosity likely to occur, practically in any desired quantity. As can be noticed from the constructional example, the appliance can be designed so as to have the various parts made easily removable for cleaning.

I claim:

1. Apparatus for uniformly distributing a fluid on to a rotating atomizing disc, comprising a pre-chamber and a distributing chamber substantially axially aligned therewith and with the rotating disc, said chambers being non-rotatable, means for charging at least one fluid into the pre-chamber, said chambers being in part defined by an axially adjustable disc and by a radially adjustable ring, the edges of the adjustable disc and ring being spaced from each other to provide a

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slot connection between the two chambers, at least one of said edges defining the slot being inclined with respect to the axis of the apparatus, whereby the area of the slot may be regulated by adjustment of the axially adjustable disc, and means to radially adjust the annular disc to vary the width of the slot along its peripheral extent.

2. A device for feeding a fluid to a rotating disc comprising; a static mixing chamber; means to introduce a fluid into said chamber; a static distributing chamber in substantially axial alignment with said mixing chamber; a wall separating said chambers, said wall having a valved aperture for permitting variable fluid flow between said chambers; and said distributing chamber having a plurality of radially spaced ports for discharging said fluid at spaced points onto the said rotating disc.

3. A device for feeding fluid to an atomizer disc comprising; a fixed mixing chamber having a fluid inlet; a fixed distributing chamber having a plurality of spaced ports in register with the surface of said disc for discharging fluid thereon; a wall separating said chambers, said wall having an aperture to permit fluid flow between said chambers; a valve element positioned in said aperture; and means for effecting relative movement of said element and said wall for varying the fluid flow between said chambers.

4. The apparatus as defined in claim 3 wherein said last mentioned means include means for moving said wall laterally with respect to said element, and separate means for moving said element into and out of register with said aperture.

5. Apparatus for feeding a fluid to a rotating atomizer disc comprising a non-rotating pre-chamber, a conduit for charging the fluid into said pre-chamber, a non-rotating distributing chamber, said chambers being in substantially axial alignment, a wall having an aperture separating said chambers, a disc extending into said aperture and spaced therefrom around at least a part of its periphery to provide with said aperture an arcuate slot leading from said pre-chamber to said distributing chamber, said slot being of varying width with the portion of greatest width being disposed opposite to said conduit, whereby substantially uniform quantities of fluid are discharged per given unit of time into the distributing chamber through any slot sector of a selected angular extent.

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