United States Patent

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[54] HUMIDIFICATION EQUIPMENT FOR GASES

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[51] **Int. Cl.**.....**B01f 3/04**

[58] **Field of Search**.....261/76; 128/194, 186

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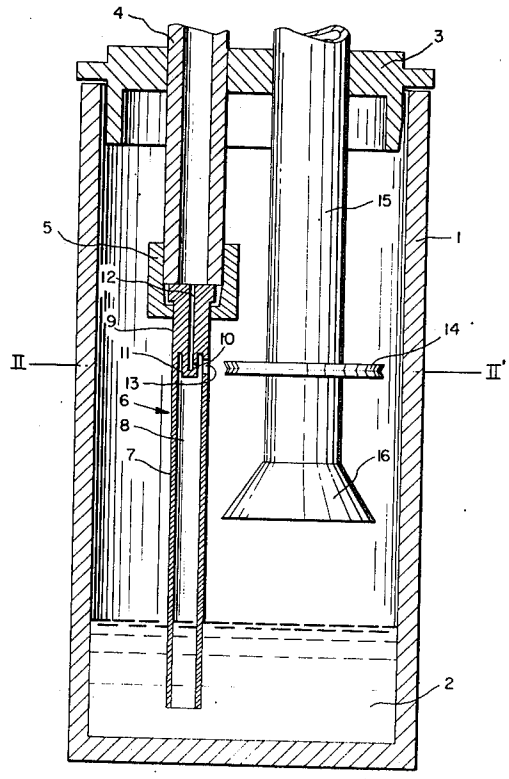
[57] **ABSTRACT**

A humidifier for gas comprising a liquid tank, gas inlet means projecting axially into a liquid introducing means for sucking in of liquid, said liquid introducing means having a larger inside cross-sectional area than said gas inlet means, said gas inlet means and liquid introducing means having a common radial opening through which the gas supplied can be blown out together with the sucked in liquid as a gas jet containing liquid particles, and a diffuser arranged in the tank opposite said common radial opening for the dividing of the liquid particles in said gas jet.

3 Claims, 2 Drawing Figures



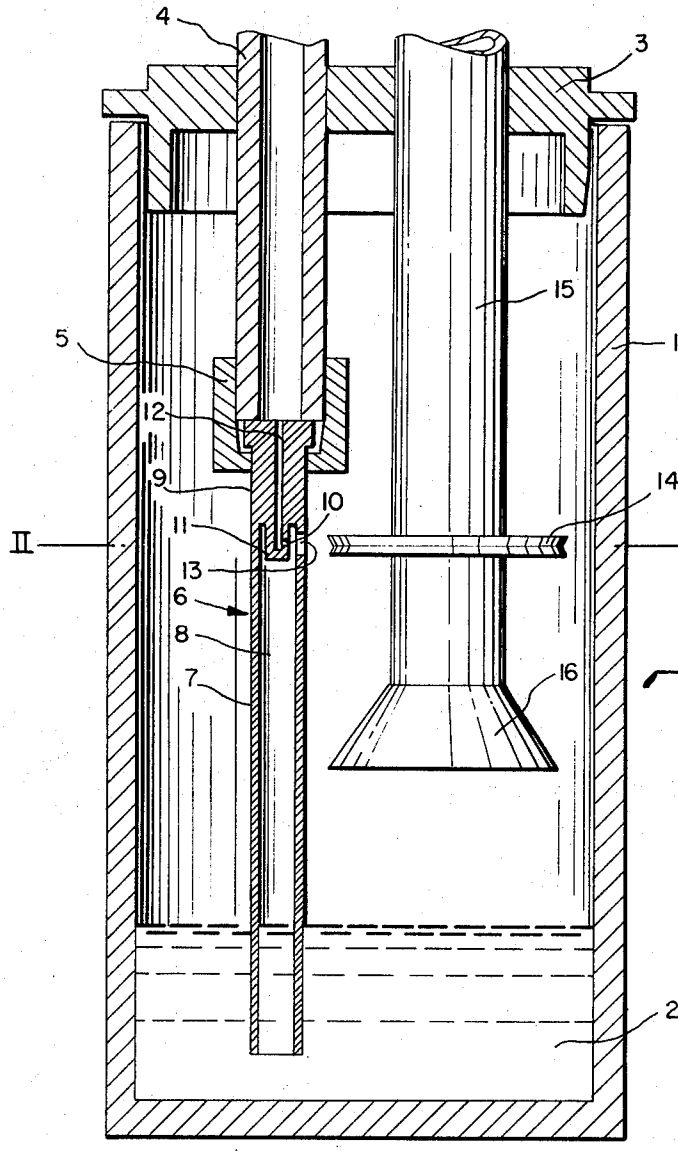


Fig. 1

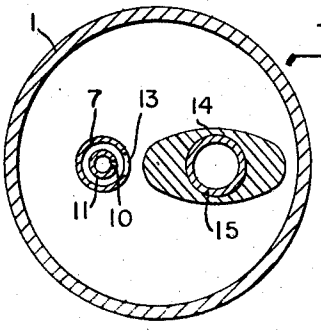


Fig. 2

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HUMIDIFICATION EQUIPMENT FOR GASES

The present invention relates to humidification equipment for gases. More particularly, the present invention is directed to a humidifier for gases capable of producing very fine liquid particles of uniform size.

Humidification equipment for gases is frequently of the type comprising a tank for the liquid, a first pipe leading into the tank intended for the gas feed, one end of which projects axially into a second pipe intended to suck in the liquid and which has a somewhat larger diameter than the first pipe. The two pipes have a common radial opening through which the gas supplied can be blown out together with the liquid sucked in. In the process liquid particles are formed in the gas jet.

One disadvantage of this type of equipment is that the liquid particles will be of varying sizes. Relatively large particles may remain for a considerable time suspended in the gas. In particular in cases where the gas is to be used for medical purposes, such as narcosis gas etc., this represents a serious drawback.

These shortcomings of this type of prior art humidifier are overcome by humidification equipment comprising a liquid tank, gas inlet means projecting axially into a liquid introducing means for sucking in of liquid, said liquid introducing means having a larger inside cross-sectional area than said gas inlet means, said gas inlet means and liquid introducing means having a common radial opening through which the gas supplied can be blown out together with the sucked in liquid as a gas jet containing liquid particles, and a diffuser arranged in the tank opposite said common radial opening for the dividing of the liquid particles in said gas jet.

The apparatus of the invention thus enables the liquid particles to be divided into very fine particles such as into a dust or haze which is fine enough to be suitable for medical uses.

Advantageously, the apparatus includes means such as a suction pipe directed into the tank for withdrawing the divided liquid particles. The diffuser is preferable arranged on the liquid withdrawing means and in one embodiment is disc-shaped with a concave impingement surface for the liquid particles contained in the gas jet. The gas inlet means and the liquid introducing means are advantageously revolvable so that the common opening they possess can be adjusted relative to the diffuser to direct the gas jet thereto tangentially.

In the following description a preferred embodiment of the invention will be described with reference to the enclosed drawing wherein:

FIG. 1 is a sectional view of the apparatus of the invention and FIG. 2 is a cross-sectional view of reduced size taken along line II—II' of FIG. 1 when the diffuser is non-circular.

A tank 1 is provided with liquid 2. From the cover 3 gas introduction means 4 is inserted into the tank 1 and is communicatably connected by connecting means 5 with integral means generally designated 6 which comprises a liquid introducing conduit 7 having a passageway 8 and a gas inlet portion 9 having a gas inlet passageway 10. Gas inlet portion 9 contains a tip 11 which projects into passageway 8 and is provided with an opening 12 which provides communication between passageway 8 and passageway 10. The inside diameter of liquid introducing conduit 7 is substantially greater than that of gas inlet portion 9. Liquid introducing conduit 7 is provided with an opening 13 in axial alignment with opening 10 of tip 11. Thus, openings 10 and 13 provide a common radial opening through which the gas together with liquid particles is blown out into the tank 1. For the dividing of the liquid particles a diffuser 14 is arranged opposite the axially aligned openings 12 and 13. It has the form of a disc and is mounted on a suction pipe 15 for the humidified gas. The impingement surface of the diffuser disc 14 is concave, which has proved to give a very fine liquid haze.

By making gas inlet portion 9 and liquid introducing conduit 7 revolvable the common opening defined by axially aligned openings 10 and 13 can be adjusted into different positions in respect to the diffuser 14. As a result the gas jet can be directed more or less tangentially against the diffuser so that various sizes of liquid particles can be achieved. Another way of directing the gas jet more or less tangential to the diffuser, consists in making the form of the diffuser non-circular. It may be, for example, elliptical as shown in FIG. 2, triangular or a combination thereof or any other suitable form. By making the diffuser revolving the gas jet may be made to impinge on the diffuser more or less tangentially.

Any liquid particles, which by chance have not been divided by the diffuser 14, are collected by the outside wall of the suction pipe 15 to drops which are returned to the liquid 2 in the tank 1. It has been found appropriate to design the suction pipe 15 with a conical end 16 which reduces the risk of an extraction of liquid drops.

It is claimed:

1. A humidifier for gas comprising a liquid tank, gas inlet means projecting axially into a liquid introducing means for sucking in of liquid, said liquid introducing means having a larger inside cross-sectional area than said gas inlet means, said gas inlet means and liquid introducing means having a common radial opening through which the gas supplied can be blown out together with the sucked in liquid as a gas jet containing liquid particles, a disc-shaped diffuser for the dividing of the liquid particles in said gas jet, a suction pipe having a conical base directed into the tank for withdrawing the divided liquid particles, said disc-shaped diffuser having a concave impingment surface for the liquid particles and being arranged on said suction pipe in the tank opposite said common radial opening.

2. The humidifier of claim 1 wherein the gas inlet means and liquid introducing means are adjustably revolvable.

3. The humidifier of claim 1 wherein the diffuser is of non-circular form and revolvable to a position such that the gas jet can be made to impinge tangentially with respect to the diffuser.

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