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DEVICE FOR ATOMIZING LIQUIDS

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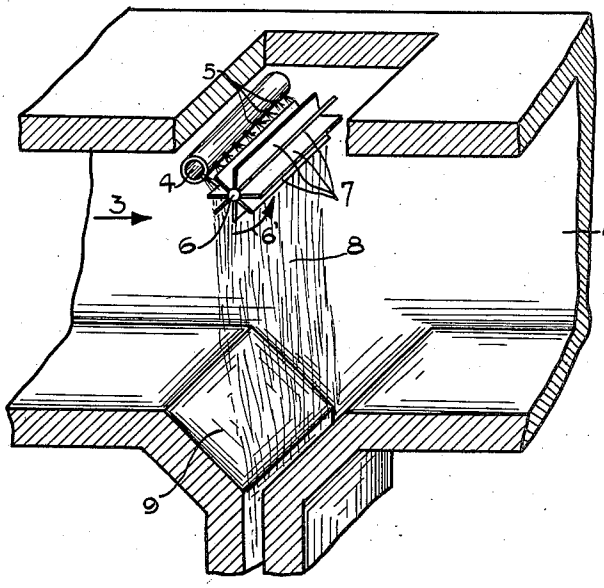


Fig. 1.

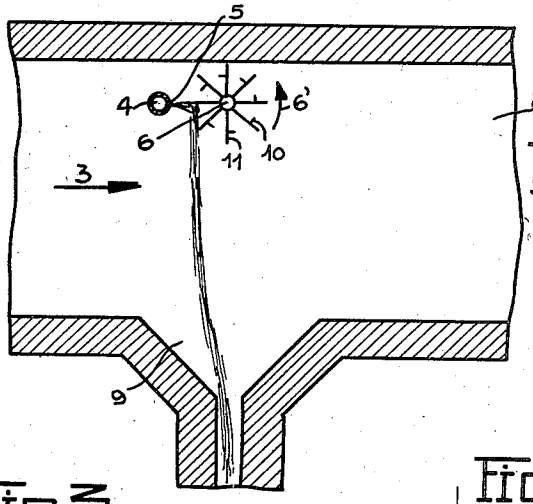


Fig. 2.

Fig. 3.

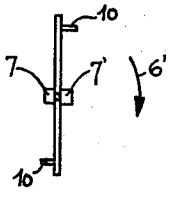
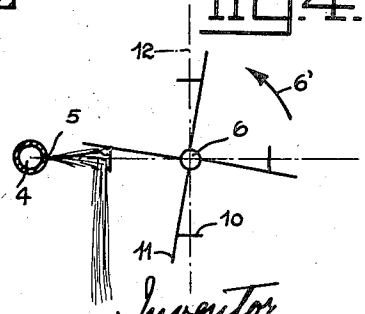


Fig. 4.



Inventor
V. Wergifosse
By C. F. Wenderoth
Atty.

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DEVICE FOR ATOMIZING LIQUIDS

Victor Wergifosse, Brussels, Belgium

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In Belgium July 16, 1932

1 Claim. (Cl. 261—90)

The present invention relates to a device for atomizing liquids, especially for the atomization of the liquids used in devices for removing dust and other impurities from gas and smoke.

There are in existence devices for removing dust having jets of water in which the atomization of the liquids is carried out by projecting them under high pressure through special nozzles and if need be against fixed surfaces.

These devices have the disadvantage that they produce a dispersion or mist of liquids and therefore cause water to be entrained and a partial vaporization in consequence of an excessively long contact between the hot gases and the liquid. The entrained liquid may lead to deterioration of the substance and the subsequent formation of harmful fogs near the factories.

Lastly, this atomization is effected through orifices having a reduced cross-section which inevitably brings about obstructions due to the impurities in suspension in the water which is used and irregularities in the dust removal.

Further, the degree of atomization of the water depends in these devices on the pressure of the water which leads to bad performance when operating at a pressure somewhat removed from a predetermined pressure.

There are also devices for mixing gases and liquids such as that described in German Patent No. 522,558 in which the liquid is atomized in the form of mists in a chamber by projecting this liquid against a wheel having curved vanes in the form of buckets so as to produce a mist in this chamber and an intimate and lengthy contact between the gases and the liquid. This intimate and lengthy contact which is an advantage if it is desired to obtain an intimate mixture because of chemical reactions, has, however, the above-mentioned serious disadvantages when it is question of dust removing.

In German Patent No. 140.273 which relates to a device for washing gases, the washing liquid is to be atomized in a chamber by means of a wheel having curved vanes which is partly immersed in the liquid.

Besides the disadvantages resulting from a too intimate mixture in the chamber, this device has the disadvantage that the atomization is made dependent upon the level of the liquid in the chamber.

Finally, British Patent No. 168.867 proposes to atomize a liquid in the direction of the propagation of the gases by means of curved vanes so as to obtain at the same time the propulsion of the gases and their intimate mixture with the gases.

This last device also has several of the disadvantages already mentioned.

To overcome these disadvantages, in accordance with the invention, the water or the dust removing liquid is projected against a cylinder having plane or substantially plane vanes and which is rotated opposite the feed conduit provided with orifices disposed parallel to the axis of rotation of the cylinder across the current of gas.

In this way, a sheet of water is projected in a predetermined direction across the current of gas and the formation of mist is prevented and practically any undesirable entraining of water and all the disadvantages which result therefrom.

Very satisfactory dust removing efficiencies are obtained with a single sheet of water.

By using two such sheets one after the other a more complete removal of dust is obtained.

According to one characteristic of the invention, the vaned cylinder may be replaced by a simple flat iron member preferably twisted helically to increase its rigidity.

According to another characteristic of the invention, the plane or substantially plane vanes are provided with a longitudinal rib at a certain distance from the free end.

Other details and features will appear in the course of the description of the annexed drawing given simply by way of example and not in any limiting sense.

Figure 1 shows in perspective a device in accordance with the invention.

Figures 2, 3 and 4 relate to various features of the invention.

Corresponding elements are designated in the various figures by the same reference numbers.

The gases circulate in a horizontal channel 2 in the direction of the arrow 3.

At the upper part of the said channel there is a conduit 4 across the direction of the current of gases which feeds the water under a moderate and variable pressure.

This conduit has orifices or slits 5.

Opposite the orifices and parallel to the conduit there is a cylinder 6 having plane or substantially plane vanes 7. These vanes may be helically twisted, their section remaining substantially plane, which increases the rigidity of the whole.

The cylinder 6 is driven in the direction of the arrow 6' by a driving device not shown in the drawing.

The water projected towards the vanes is sub-

divided and projected downwards across the current of gases in the form of a sheet of water.

Towards the lower end, this sheet is slightly deviated by the current of gases.

The sheet may be projected more or less obliquely across the current of gas by displacing the conduit angularly with respect to the cylinder or vice versa.

The used water is collected with the entrained or dissolved dusts in a basin or furrel **9**.

Two or more such devices can of course be provided, one after the other, to increase the dust removing efficiency without producing any entraining of water.

Likewise, a conduit **4** may be disposed vertically in the middle of the channel **2** and it may be provided with two series of orifices diametrally opposite each other and a vertical cylinder opposite each series of orifices so as to produce the atomization of a sheet of water towards each of the vertical walls. The water and the dusts may in this case be gathered in chambers formed for this purpose in the walls.

According to one feature of the invention and as represented in Figure 2, the vanes **7** are provided with a longitudinal rib **10** at a certain distance from the free end **11** of the vane.

In this way the water is prevented from spreading to an exaggerated extent over the vane as a consequence of the violence of the shock or in consequence of the speed of the jets of water and thus to be forced as far as to the periphery of the supporting cylinder of the vanes.

In this way, projections of water which may be called parasite projections are prevented from coming next to the sheet of water proper so as to form mists which might be entrained by the gases. The directional effect is sharper in the sense that a nearer approximation is made to the theoretical object to be attained, that is to say, the formation of a sheet or screen of water.

When a flat iron member is used, its rigidity may be increased by longitudinal and central ribs **7'** as shown in Figure 3.

These reinforcing ribs may be dispensed with when the flat iron member is provided with longitudinal ribs **10** at a certain distance from the extremities **11** of the member because these ribs then give the required rigidity as well as the sharper directional effect.

According to another feature of the invention the vanes **7** with their ribs **10** are slightly inclined relatively to the diametral planes of the cylinder **12** passing through the points of attachment of the ribs on the cylinder, as represented in Figure 4, so as to bring the centre of gravity of the assembly consisting of the vane and rib into the diametral planes so as to avoid any extraction effect due to centrifugal force. This disposition thus allows the method of joining the vanes to the cylinder to be simplified.

By means of the described process of the illustrated device, the flow of the water can be adapted to the quantity of dust to be retained and more especially the flow can be reduced when the quantity of dust in the smoke to be treated is reduced, without any harmful effect on the efficiency of the atomization and therefore on the dust removal because the degree of atomization is independent of the pressure.

This pressure may be a moderate one and, for example, merely sufficient to cause the jets of water to traverse the space between the conduit **4** and the vanes **7**. This results in the possibility of providing slits or orifices **5** which are sufficiently large to avoid frequent obstructions. The cleaning of the conduit **4** from outside the channel can be made possible with the greatest ease.

The projection across the current of gases of a sheet of water moving at high speed produces rapid entrainment of the dust particles and at the same time avoids any risk of partial vaporization of the water. Further, by this method of dust removal the cooling of the combustion gases is reduced to a minimum and the loss of draught due to such a cooling is negligible.

Finally, the necessity of using baffles or like devices which cause loss of charge is avoided.

The described device may, in addition to the removal of dust from gases or industrial smoke, be used also for the removal of suspensions in any gases by means of a liquid entrainment or vaporization of which by the said gases must be avoided as far as possible.

I claim:

In a device for removing dust from gases and smoke, a gas channel through which a current of gases is caused to circulate, and at the upper part of said channel, across the current of gases, a perforated conduit for the dust removing liquid, a cylinder disposed in close relation and parallel to said conduit, opposite the perforations, plane longitudinal vanes on said cylinder, longitudinal ribs on said vanes disposed at right angles to the plane of the vanes at a short distance from their outer end, means to rotate the cylinder which is located relatively to said perforated conduit so as to project a substantially plane screen of said liquid at substantially right angles across the current of gases and means to collect said liquid immediately after said projection, opposite said cylinder and said conduit.

VICTOR WERGIFOSSE.