March 9, 1926. 1,575,671

W. H. BEANES

APPARATUS FOR ATOMIZING LIQUIDS AND MIXING SAME WITH GASEOUS SUBSTANCES

Filed Feb. 20, 1925 2 Sheets-Sheet 1

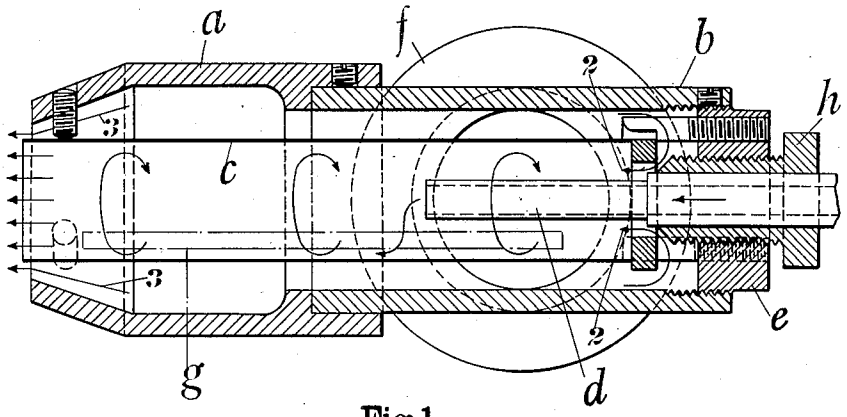

Fig.1

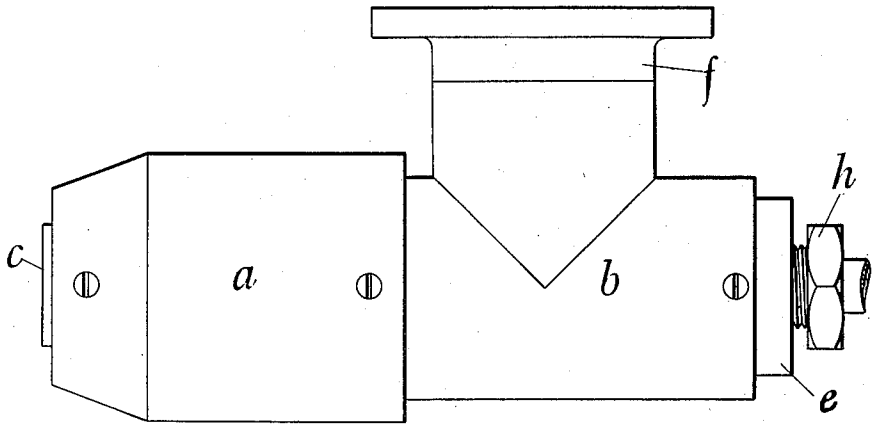

Fig.2

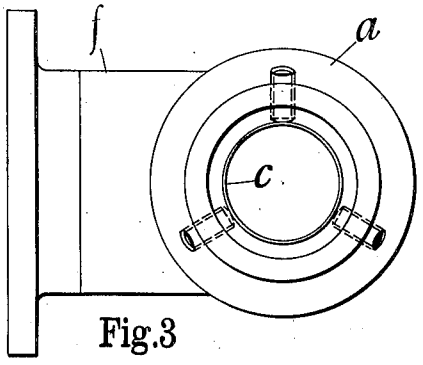

Fig.3

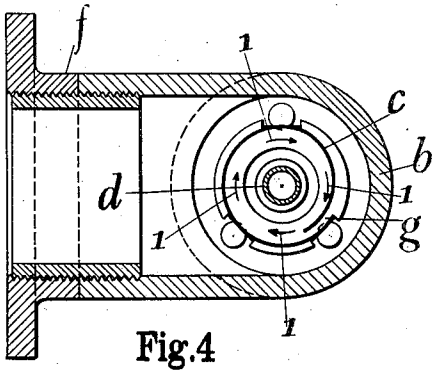

Fig.4

Inventor
W. H. Beanes
By Marks & Clark
Attys.

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W. H. BEANES

APPARATUS FOR ATOMIZING LIQUIDS AND MIXING SAME WITH GASEOUS SUBSTANCES

Filed Feb. 20, 1925 2 Sheets-Sheet 2

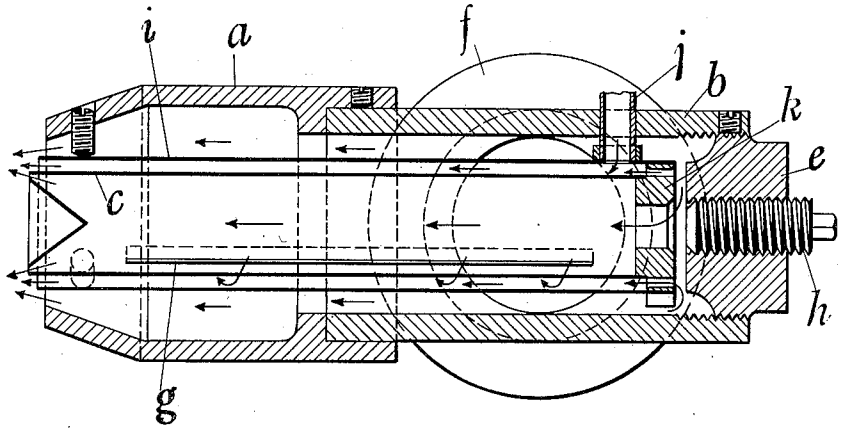

Fig.5

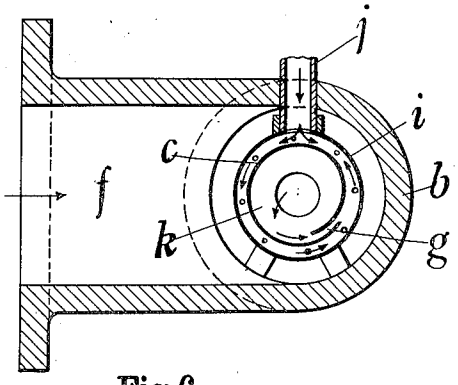

Fig.6

Inventor
W. H. Beanes
By Marks & Clerk
Attys.

Patented Mar. 9, 1926. 1,575,671

UNITED STATES PATENT OFFICE.

WARWICK HENRY BEANES, OF KINGSWAY, LONDON, ENGLAND, ASSIGNOR TO BAKER-PERKINS COMPANY, INCORPORATED, OF WHITE PLAINS, NEW YORK.

APPARATUS FOR ATOMIZING LIQUIDS AND MIXING SAME WITH GASEOUS SUBSTANCES.

Application filed February 20, 1925. Serial No. 10,674.

To all whom it may concern:

Be it known that I, WARWICK HENRY BEANES, a British subject, residing at Kingsway House, Kingsway, London, W. C. 2, England, have invented certain new and useful Improvements in Apparatus for Atomizing Liquids and Mixing Same with Gaseous Substances, of which the following is a specification.

In the use of oil fuel for furnaces, in humidifying air, in the spraying of liquids of various kinds and for other services, it is necessary to break up, atomize or vaporize a liquid and thoroughly mix same with air, steam or other gaseous or like substances. The object of this invention is to provide improved means for accomplishing such atomization and mixing in a very convenient and efficient manner.

Referring to the two accompanying sheets of explanatory drawings:—

Figure 1 is a sectional elevation and Figure 2 a plan of one form of apparatus constructed in accordance with this invention.

Figure 3 is a view showing the discharge end of such apparatus while Figure 4 is a sectional end view through the air admission branch.

Figure 5 is a sectional elevation and Figure 6 a sectional end view showing another form of apparatus as constructed in accordance with the invention.

The same reference letters in the different views indicate the same or similar parts.

As illustrated at Figures 1 to 4, the apparatus is made up from a pair of conduits or cylindrical parts arranged the one within the other and with an annular space between them. The outer part comprises the nozzle *a* secured to tube or cylinder *b* while the inner part is formed by tube *c*. The liquid is admitted through the hollow stem *d* which projects through the plug *e* at one end of *b*. The air or steam, or both air and steam or other gaseous substances, hereinafter termed air, is admitted under suitable pressure to the annular space aforesaid by way of the branch connection *f*. From such space the air or a portion of it, flows into the inner tube *c* through a tangentially disposed or peripheral slit or aperture *g* arranged or disposed so that a whirling or cyclonic action is set up by the incoming air, as indicated by the arrows 1 at Figure 4, whereby on its meeting the liquid the latter is projected as a thin film against or upon the inner wall or surface of the tube *c*, or broken up into a fine state of division.

Another portion or steam of air flows from the said annular space into the tube *c* at the end of the latter at which the liquid is introduced as indicated by the arrows 2 at Figure 1. The said stream propels the aforesaid whirling air and liquid towards the opposite or discharge end of the tube *c*. During such progression through the tube *c* the liquid becomes dispersed throughout or intimately mixed with the air. At the discharge end the mixture receives a further stream of air indicated by the arrows 3 at Figure 1, from the adjacent end of the annular space, and the whole passes from the apparatus as a mist or spray or with the liquid dispersed in a fine state of division throughout the air.

The quantity of air admitted by the branch *f* to the said annular space may be controlled by a valve or otherwise. The admission of air from such annulus to the tube *c* from the inner end of the latter is regulated preferably by adjustment of the screwed sleeve *h* (Figures 1 and 2) the inner end of which is adjacent the inner end of tube *c*.

The form of apparatus illustrated by Figures 5 and 6 is made up from three tubular parts nested together with an annular space between the inner part *c* and the intermediate part *i* and between the latter and the outer part consisting of nozzle *a* and tube *b*. In such example the air is first admitted to the outer annulus through branch *f* and the liquid to the inner annulus through connection *j*. From the outer annulus the air passes into the inner annulus and also into the inmost tube *c* through apertures in the end piece or plug *k*. From the interior of *c* air passes into the inner annulus by way of peripheral or tangential slit or aperture *g*, so disposed as to set up the desired whirling or cyclonic action, as aforesaid, to effect the diffusion of the liquid. Air will also pass axially through the inner tube *c* and both of the annular spaces. The admission of air through the inner end of tube *c* may

be regulated by screwed stem *h*; similarly, admission through the inner end of the inner annulus may be regulated by plug *e*.

Any suitable means are provided for controlling the supply of liquid and of air to and within the apparatus.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

Apparatus for atomizing liquids and mixing same with air, comprising a cylinder having a plug at one end and an outlet nozzle at the opposite end, a tube nested within said cylinder and extending through said nozzle the said nested parts forming an annular chamber between them, a branch connection admitting compressed air to said chamber, means for admitting liquid to said tube, and means admitting air from the said chamber to the said tube both by way of a tangential port and a port at the inner end of the tube, and a screw in said cylinder plug controlling the quantity of air admitted by way of said end port.

In testimony whereof I have signed my name to this specification.

WARWICK HENRY BEANES.