E. K. STANDISH.

FLUID SPRAY NOZZLE.

APPLICATION FILED AUG. 24, 1915.

1,186,241. Patented June 6, 1916.

Fig. 1.

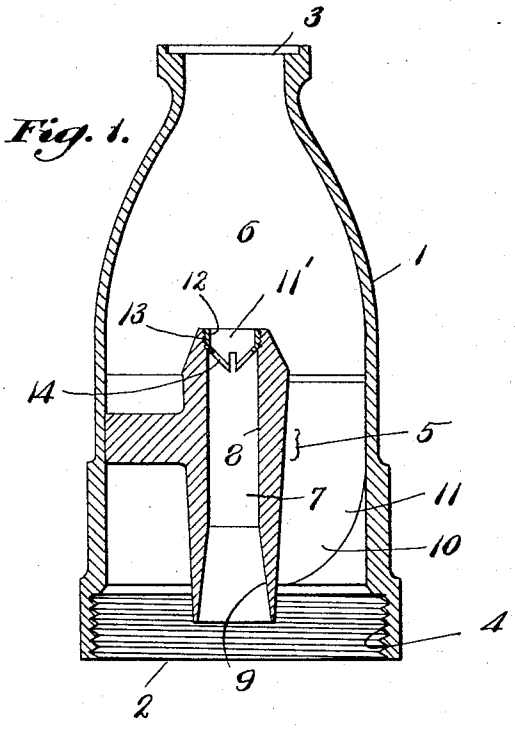


Fig. 3.

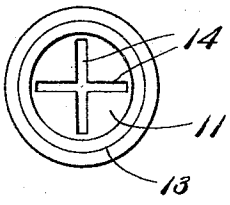
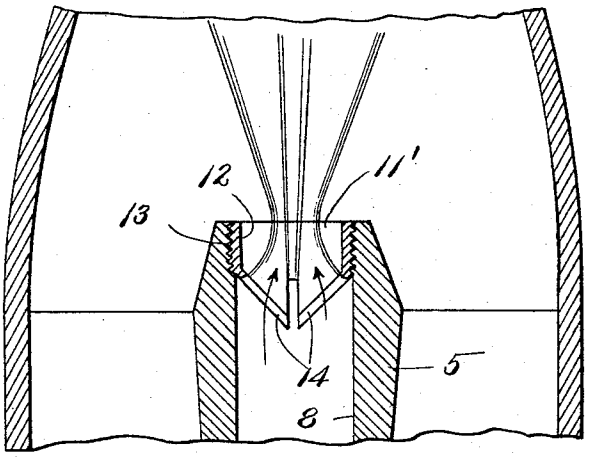


Fig. 2.



Inventor
Edward K. Standish
by Emery, Booth, Janney & Varney
Attys.

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD K. STANDISH, OF STOUGHTON, MASSACHUSETTS, ASSIGNOR TO SPRAY ENGINEERING COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

FLUID-SPRAY NOZZLE.

1,186,241. Specification of Letters Patent. Patented June 6, 1916.

Application filed August 24, 1915. Serial No. 47,137.

To all whom it may concern:

Be it known that I, EDWARD K. STANDISH, a citizen of the United States, and a resident of Stoughton, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Fluid-Spray Nozzles, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to fluid spray nozzles of general application.

In order that the principle of the invention may be readily understood, I have in the accompanying drawing disclosed a single type of nozzle embodying my invention.

In said drawing: Figure 1 is a vertical central section of a nozzle constructed in accordance with my invention; Fig. 2 is a similar view of a portion of the nozzle upon an enlarged scale and showing the action of the liquid within the same; and Fig. 3 is a plan view of a cap piece employed in this embodiment of my invention.

This invention in certain aspects thereof is an improvement upon the spray nozzle shown in the patent to Aubrey G. Eneas, No. 1,101,264, dated June 23, 1914. In certain aspects thereof my invention may be used in other relations and in nozzles of types other than that shown in the said Eneas patent.

By the nozzle herein disclosed, I form and distribute over preferably an extended area a spray composed of or comprising water or other liquid or suitable fluid, and which is the most effective embodiment thereof of substantial homogeneity throughout. Such spray is caple of use in many and varied relations. Among other uses to which I am in no wise limited in the practice of my invention, I may enumerate the following: for aerating municipal and other water supplies in reservoirs and other places; in connection with cooling ponds to spray the water heated in condensers of turbine or other engines; for spraying effluent in connection with sprinkling filter beds, for precipitating coal dust; for air washing; for condensing vapors; for humidifying air in chemical plants and cotton mills, for oil burners and fire extinguishers, and in fact for many other uses not herein necessary to enumerate.

In carrying out my invention I preferably project the fluid of whatever nature in a flaring spray, and I preferably simultaneously produce both rotary and non-rotary jets and mix, mingle or blend said jets within a confined space from which I cause the mixed, mingled or blended mass to issue in a spray of substantially uniform homogeneity.

Preferably I provide a central or axial jet which, in the disclosed embodiment of my invention, is a non-rotary jet. Preferably also I provide one or more surrounding jets, which, in the disclosed embodiment of my invention, are rotary jets. I cause said rotary jet or jets to impinge more or less transversely upon the axial or central jet, with the result that said jets are sufficiently mixed to produce a spray of the character described when discharged from the confined space.

I preferably provide a chamber in advance of the jet producing means, said chamber being so shaped and of such volume as to permit an effective mixture or blending of the jets before they issue in spray form from the chamber. This result may be accomplished in any desired manner, as by so shaping the chamber or so positioning an abutment therein as to cause impact thereon of one or more of the surrounding jets, and the rebound thereof with the result of mixing or blending said jets within the confined space. In that embodiment of my invention herein selected for illustration, the nozzle comprises a shell or casing 1 constituting an outer mixing chamber and having an entrance 2 for the water or other liquid to be sprayed and a discharge orifice 3. The nozzle may be suitably connected to a hose or other means for conveying the liquid or fluid to be sprayed. For this purpose, I have represented the nozzle 1 as interiorly threaded at 4.

Within the shell 1 I position, or if desired integrally form therewith, an inner liquid guiding member indicated generally at 5, and herein represented as detachable from the shell 1. If desired, the said member 5 may be externally threaded, so as to be screwed into position in the shell 1, or it

may be slid into place and held therein by a set screw passing through the wall of the shell 1 at some suitable point. My invention may be embodied in a nozzle wherein the inner member 5 is positioned and held in place in any suitable manner.

When the inner member 5 is suitably positioned, there is formed in advance thereof a mixing chamber 6.

While the inner member 5 may be constructed in any suitable manner to produce the desired results, I preferably so construct it that it will discharge or direct into said mixing chamber 6 a plurality of jets. For this purpose I preferably employ a single central jet which, in this embodiment of my invention, is a non-rotary one, and a plurality of exterior jets which, in this embodiment of my invention, surround the central jet and are rotary. The surrounding jets are given a rotary or whirling character in any suitable manner.

The central jet is produced by the central passage 7 formed in the inner member 5 and receiving the water or other liquid or fluid directed thereinto under pressure and from any suitable source. The central passage 7 has preferably a smooth surface 8, and preferably the lower or inner end thereof is somewhat flaring, as indicated at 9 in Fig. 1. Surrounding the straight central passage 7 are a plurality of divergent curved passages 10 formed between the wall of the central passage 7 and the inner wall of the shell 1. Said passages 10 likewise receive liquid or fluid under pressure from the same source and impart a whirling or rotating action to the jets passing therethrough as well as a centrifugal action. The jets passing through the passages 7 and 10 are primarily of equal velocity, but the velocity of the jets passing through the passages 10 is reduced below that of the central jet, owing to the contact of said surrounding jets with the inner wall of the mixing chamber 6.

The surrounding passages 10 may be formed in any suitable manner and preferably by a series of vanes 11, each of which may extend partly about the central passage 10, or may extend one or more times thereabout. The circumferential extent of said vanes, the pitch thereof and the number of vanes may be widely varied within the scope of the invention. If desired, the vanes may be formed as a single or a double spiral extending a plurality of times about the passage 7 at a suitable pitch. However said vanes be formed and whatever be their extent, the jets passing through the passages 7 and 10 converge and meet within the chamber 6, and the tapering formation of said chamber 6 compels the mixing of said jets. The impinging of the jets upon each other thoroughly breaks them up and compels a thorough mixing and distribution to the constituent parts thereof, so that as the liquid emerges from the nozzle, it spreads into a cone, whose apex is the orifice of the nozzle, the spray being substantially uniformly and thoroughly distributed throughout the entire cone.

Instead of forming the central passage 7 as in said patent to Eneas, I provide the same with some suitable obstruction upon which the central jet impinges, and through or past which said jet passes into the mixing chamber. While such obstruction may be variously constructed, it is preferably so arranged as to provide one or more transverse slots, through which the liquid must pass in entering the mixing chamber. In accomplishing this result, I may form the obstruction integral with the passage 7, as, for example, by providing the upper end of such passage with a partition or closure slitted for the passage of the liquid. Preferably, however, instead of forming the obstruction integral with the walls of the passage, I provide a cap 11′ threaded externally at 12 and tapped into the internally threaded end 13 of said passage 7. The said cap is preferably provided with cross slits 14, which may extend normal to the axis of such passage 7, but which preferably are in a wall downwardly inclined with respect thereto, as indicated most clearly in Figs. 1 and 2.

The provision of transverse and preferably intersecting slits compels a thorough intermixture of the constituents of the liquid passing up through the passage 7. This is the case whether said slots extend normal to the axis of said passage 7 or at an inclination thereto. Such intermixing is, however, greatly accentuated when said slits are downwardly inclined, as indicated in Figs. 1 and 3. Because of said inclined construction of slits, the streams are caused to impinge directly upon each other, as indicated most clearly in Fig. 2, being more or less broken up and then thoroughly intermixed with the rotary streams issuing from the passages 10.

Preferably the cap 11′ is formed as a separate member in order to permit the ready cleansing of the nozzle. If removable, it may be secured in position in any suitable manner and, as stated, it may be formed as an integral portion of the passage 7.

The mixing chamber 6 is preferably relatively large compared with the orifice through which the fluid issues from the nozzle. Said chamber is of sufficient volume and so shaped as to permit and effect blending and mixing of the jets before issuance from the nozzle.

It will be evident from the foregoing de-

scription that a spray nozzle constructed in accordance with my invention effects a thorough mixing of the streams of liquid within the nozzle, and that the streams are discharged from the nozzle in such manner as to form a full spray of substantially homogeneous character.

Having thus described one illustrated embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for the purposes of limitation, the scope of the invention being set forth in the following claims.

Claims:

1. In a spray nozzle, means for simultaneously producing both a rotary and a non-rotary jet, means to project the rotary jet into blending union with the non-rotary jet before issuance of said jets from the nozzle, and means to cause an intermixture of the constituents of the non-rotary jet before mixture with said rotary jet.

2. In a nozzle, an outer shell having an entrance and a discharge, an inner member having a central passage and surrounding passages shaped to form one or more rotary jets and a mixing chamber within the nozzle in advance of said passages, said central passage having obstructing means to cause a mixing of the constituents of the liquid in their passage therethrough prior to their admission to the mixing chamber.

3. In a nozzle, a shell having an entrance and a discharge and an inner member having a central, straight passage and surrounding passages shaped to form rotary streams and a mixing chamber within the nozzle in advance of said passages, said central passage having an obstructing member provided with one or more cross slits.

4. In a nozzle, an outer shell having an entrance and a discharge and an inner member having a central passage and surrounding passages shaped to form rotary jets and a mixing chamber within the nozzle in advance of said passages, said central passage having an obstructing portion provided with intersecting cross slits.

5. In a nozzle, an outer shell having an entrance and a discharge and an inner member distinct from said shell but adapted to be positioned therein, the said inner member having a central, straight passage provided with a smooth, inner surface and a series of surrounding vanes to form rotary jets, there being a mixing chamber within the shell in advance of the inner member, said central passage having a transverse portion provided with intersecting cross slits.

6. In a nozzle, an outer shell having an entrance and a discharge and an inner member distinct from said shell but adapted to be positioned therein, the said inner member having a central, straight passage provided with a smooth, inner surface and a series of surrounding vanes to form rotary jets, there being a mixing chamber within the shell in advance of the inner member, said central passage having a downwardly inclined portion provided with intersecting, cross slits to compel the discharging portion of the central jet of liquid to impinge upon each other prior to their admission to the mixing chamber.

7. In a nozzle, an outer shell having an entrance and a discharge and an inner member distinct from said shell but adapted to be positioned therein, the said inner member having a central, straight passage provided with a smooth, inner surface and a series of surrounding vanes to form rotary jets, there being a mixing chamber within the shell in advance of the inner member, said central passage having a detachable cap provided with intersecting, cross slits.

8. In a nozzle, an outer shell having an entrance and a discharge and an inner member distinct from said shell but adapted to be positioned therein, the said inner member having a central, straight passage provided with a smooth, inner surface and a series of surrounding vanes to form rotary jets, a mixing chamber in advance of said central passage and said vanes, said central passage having a detachable cap provided with one or more downwardly inclined slits.

9. In a nozzle, an outer shell having an entrance and a discharge, and an inner member having a central passage and surrounding passages shaped to form one or more rotary jets and a mixing chamber in advance of said passages, said central passage having obstructing means at substantially the discharge end thereof.

10. In a nozzle, an outer shell having an entrance and a discharge, and an inner member having a central passage and surrounding passages shaped to form one or more rotary jets, there being a mixing chamber within the outer shell in advance of the inner member, the central passage of said inner member having slitted obstructing means at substantially the discharge end thereof.

11. In a spray nozzle, means for producing both a substantially central jet and one or more outer jets, a mixing chamber in advance of said means, whereby a mixing of said jets is caused within the nozzle, and means to divide said substantially central jet and to project the divisions thereof into enforced mixing relation.

12. In a spray nozzle, means for producing both a substantially central jet and one or more outer jets, a mixing chamber in advance of said means, whereby a mixing of said jets is caused within the nozzle, and

means to divide said substantially central jet and to project the divisions thereof into enforced mixing relation with each other prior to the admission of said central jet into the mixing chamber.

13. In a spray nozzle, means for simultaneously producing both a central jet and an outer jet, means to project the central jet into blending union with the outer jet before issuance of said jets from the nozzle, and means to cause an intermixture of the constituents of the central jet before mixture with the outer jet.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD K. STANDISH.

Witnesses:

ROBERT H. KAMMLER,

IRVING U. TOWNSEND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."