Feb. 11, 1947. C. R. KEEP 2,415,794

SPRAY NOZZLE

Filed May 10, 1945

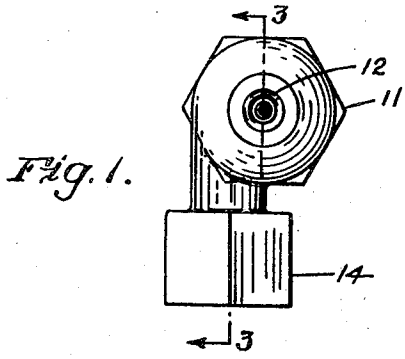

Fig. 1.

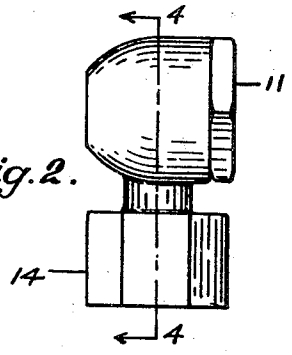

Fig. 2.

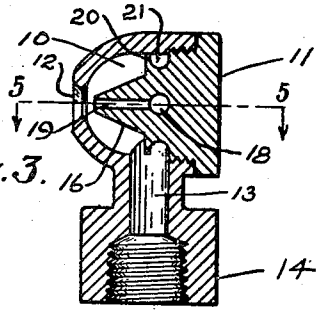

Fig. 3.

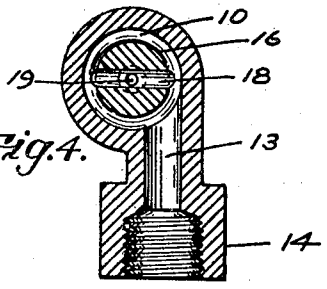

Fig. 4.

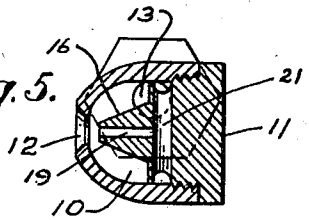

Fig. 5.

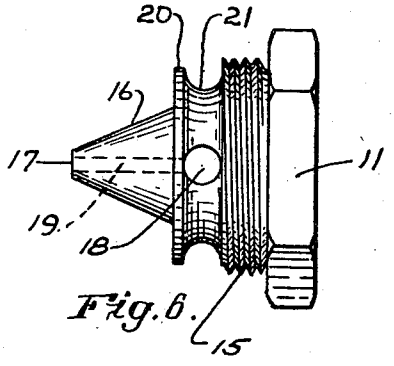

Fig. 6.

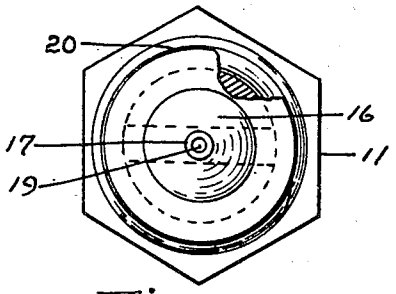

Fig. 7.

Inventor:
Charles R. Keep
By: Robert J. Palmer
Attorney.

Patented Feb. 11, 1947

2,415,794

UNITED STATES PATENT OFFICE

2,415,794

SPRAY NOZZLE

Charles R. Keep, Norwood, Mass., assignor to B. F. Sturtevant Company, Boston, Mass.

Application May 10, 1945, Serial No. 593,062

3 Claims. (Cl. 299—115)

1

This invention relates to spray nozzles, and relates more particularly to nozzles for spraying water in the conditioning of air.

Spray nozzles now in common use in air washers, have throats in which the water to be sprayed is introduced, and which connect tangentially with tapered whirl chambers having discharge outlets at their narrowest portions. The water emerges from such nozzles in the form of a hollow cone of spray droplets. Nozzles of this type are frequently used in air humidifiers and dehumidifiers where the purpose is to spray water directly into the air streams.

Where it is desired to spray water upon the surfaces of heat exchange tubes and upon filters, the previously described nozzles are not satisfactory for the reasons that the water droplets in the spray are not coarse enough, and the volume of water sprayed at a given pressure is insufficient. A nozzle that is satisfactory for such duties is disclosed in my Patent No. 2,257,691, which issued September 30, 1941.

This invention provides a nozzle which is an improvement upon the nozzle disclosed in my said patent in that it can be manufactured more accurately at less expense, and can be serviced and repaired at less expense.

A feature of this invention resides in the provision of an inner nozzle formed as part of a removable cap threaded into the back wall of an outer nozzle, the inner nozzle receiving water from the throat of the outer nozzle and discharging such water into the nozzle outlet. Such inner nozzles are easily removed, serviced or repaired and replaced, and enable nozzles normally spraying small volumes of fine spray, to be converted into nozzles spraying large volumes of coarser spray.

An object of the invention is to provide a wide angle spray filled with relatively coarse liquid droplets.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a front elevation of a nozzle embodying this invention;

Fig. 2 is a side elevation of the nozzle;

Fig. 3 is a sectional view along the lines 3—3 of Fig. 1;

Fig. 4 is a sectional view along the lines 4—4 of Fig. 2;

Fig. 5 is a sectional view along the lines 5—5 of Fig. 3;

Fig. 6 is an enlarged side elevation of the cap of the nozzle, and

2

Fig. 7 is an enlarged end view of the cap at the outlet end thereof.

The nozzle has the hollow, tapered, whirl chamber 10 which is closed off at its largest end by the removable cap 11, and which has at its smallest end the centrally located, diverging outlet 12. The cylindrical, throat opening 13 extends tangential to the periphery of the chamber 10, and into the threaded base 14 which is adapted to be screwed onto a liquid supply pipe or header. The passage 13 feeds liquid from the base 14 tangentially into the chamber 10 so that the liquid is given a spin around the interior of the chamber before it emerges from the outlet 12.

The cap 11 has a nozzle portion 16 which extends inwardly into the chamber 10, and has a grooved portion 21 between the threaded portion 15 and the nozzle portion 16. The grooved portion 21 is circular in cross section and extends perpendicular to the axis of the nozzle portion 16, which axis coincides with the axis of the outlet 12 when the nozzle is assembled.

The grooved portion 21 has the circular opening 18 extending therethrough. The nozzle portion 16 has the circular opening 19 extending along its axis from its inner end into the opening 18.

The grooved portion 21 is arranged as best illustrated by Fig. 3, to have its inner flange 20 extend into about the center of the inner end of the passage 13, and to contact the inner surface of the whirl chamber 10 so that except adjacent the passage 13, the grooved portion 21 and the inner surface of the whirl chamber 10 form a closed circular passage through which liquid supplied by the passage 13 rotates.

The liquid rotating in the grooved portion 21 as described, is under pressure and enters the opening 18, then passes into the opening 19, and then is projected into the center of the nozzle outlet 12.

The liquid entering the whirl chamber 10 directly through the passage 13, is projected through the outlet 12 in a wide angle spray. The liquid projected through the cap opening 19 into the outlet 12, reacts with the water passing directly from the whirl chamber 10 into the outlet 12, causing a larger liquid volume to be projected and the spray to be filled with relatively coarse droplets.

An advantage of the construction disclosed herein is that the inner nozzle can be exactly aligned with, and accurately spaced from, the nozzle outlet without skilled effort.

Another advantage is that through the inner nozzle being readily removable with the cap, its

passages can be easily inspected and cleaned, and if necessary, the inner nozzle can quickly be replaced.

Another advantage is that a single outer nozzle structure can be used for different functions. By using the usual removable cap having a flat inner surface, the nozzle can be used for cleaning, humidifying and dehumidifying air by direct spray contact. By using the cap disclosed herein, the same nozzle can be converted for the washing of heat exchange coils such as evaporator and condenser coils, and the wetting of filters through which the air to be conditioned passes.

The tapered inner nozzle also performs the function of centering the spinning liquid in the chamber 10, about the axis of the outlet 12.

The groove 21 and the openings 18 and 19 intercept a portion of the liquid from the passage 13, which otherwise would enter the whirl chamber 10. The nozzle portion 16 extending into the chamber 12, decreases its volumetric area and compensates for the decreased volume of liquid.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact arrangement illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A spray nozzle having an inner whirl chamber with converging walls at one end thereof, said walls having an outwardly diverging outlet therein, said nozzle having a liquid supply channel with a wall connecting substantially tangentially with a wall of said chamber whereby the liquid entering said chamber is given a spin, a removable cap in the wall of said chamber opposite said outlet, said cap having a portion extending into said chamber, said portion having a passage therein in alignment with said outlet, said portion having a groove formed therein around said passage and having a second passage extending in said groove through said first mentioned passage, said groove and passages deflecting liquid from said chamber into the liquid passing directly from said chamber into said outlet.

2. A spray nozzle according to claim 1 in which the edges of said groove contact the inner surface of said chamber and said groove extends across said supply channel.

3. A spray nozzle according to claim 1 in which a flange on said portion forms the wall of said groove nearest said outlet, and said portion converges from said flange towards said outlet.

CHARLES R. KEEP.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,257,691	Keep	Sept. 30, 1941
2,213,928	Gold et al.	Sept. 3, 1940
530,620	Maher	Dec. 11, 1894
2,110,409	Veach	Mar. 8, 1938
1,508,281	Kelly	Sept. 9, 1924

FOREIGN PATENTS

Number	Country	Date
396,476	French	Jan. 28, 1909