

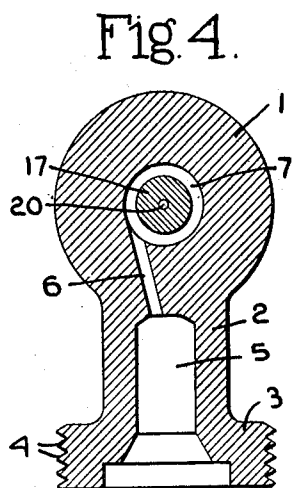
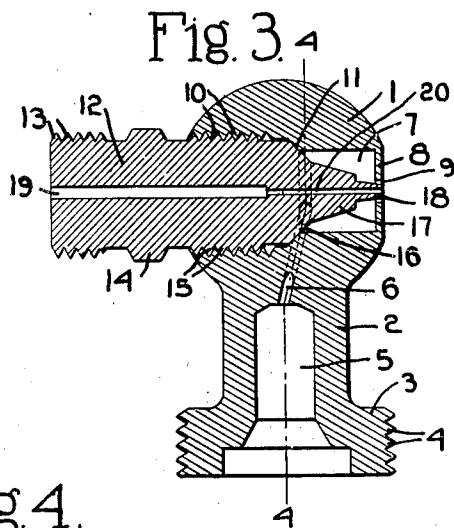
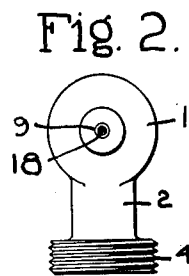
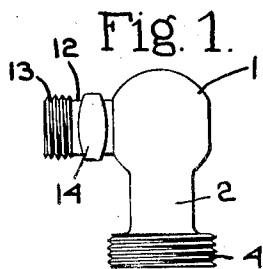
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H. F. SIMON

VAPORIZER

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# UNITED STATES PATENT OFFICE.

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## VAPORIZER.

Application filed September 16, 1921. Serial No. 501,216.

*To all whom it may concern:*

Be it known that I, HERMAN FREDERICK SIMON, a citizen of the United States, and resident of Fitchburg, county of Worcester, State of Massachusetts, have invented an Improvement in Vaporizers, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in vaporizing apparatus, particularly such as are employed for imparting additional moisture to the air of an enclosure such as a textile factory, where it is desirable to increase the natural humidity of the air. More specifically, the present invention relates to improvements in vaporizing heads of the "turbo" type, exemplified by the disclosure in Patent No. 869,945, granted November 5, 1907 to Albert W. Thompson.

The "turbo" type of vaporizer comprises a head having a cylindrical chamber and an apertured stem having a duct leading tangentially into said chamber, through which a gaseous fluid under pressure, such as compressed air, is introduced. The end wall of the chamber is provided with a central outlet. In prior constructions, the walls of the chamber have extended through the opposite side of the head, and have been screw-threaded to engage complementary screw threads upon a liquid inlet member having a nozzle in axial alignment with the outlet aperture in the head. The inlet member has been usually provided with a central duct extending through a stem, which is connected with a suitable water supply pipe, in which a level of water is maintained at a short distance below the level of the duct in the liquid inlet member.

By reason of this construction, the fluid under pressure rushing through the chamber, assumes a whirling motion, and issues from the outlet in a conoidal vortical form. The air thus rushing past the nozzle creates a sufficient vacuum to draw the liquid through the inlet duct nozzle by inspiration. As the liquid issues from the nozzle, it is atomized or vaporized by the vortical current of air issuing from the outlet in the head. In previous constructions, means have been provided for adjusting the position of the nozzle relatively to the outlet, and in order that the vaporizer shall func-

tion efficiently, a very careful adjustment has been necessary, which required the attendance of a skilled operator.

One of the objects of the present invention is to provide a vaporizer of this type in which means are provided for properly correlating the relation between the nozzle and the outlet so that the device may be assembled by unskilled workmen, and when assembled will operate at its highest efficiency without the necessity of any adjustment.

A further object of the invention is to provide a more economical construction in which the parts of the vaporizer may be formed as solids of revolution constructed from bar stock upon automatic machines, such as screw machines.

Other objects and features of the invention will more fully appear from the following description and the accompanying drawings, and will be pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a side elevation of a vaporizer head embodying my invention.

Fig. 2 is an end elevation viewed toward the outlet.

Fig. 3 is a vertical, longitudinal, median sectional view.

Fig. 4 is a transverse sectional view taken on planes indicated by the broken line 4—4, Fig. 3.

The vaporizer illustrated herein comprises a head 1 preferably of spheroidal form, having a stem 2, provided with an enlarged base portion 3, having a screw-threaded periphery 4 adapted to be connected by a suitable union to a supply for a gaseous fluid under pressure such as a compressed air line. The stem 2 is provided with a chamber 5, extending in proximity to the head, and communicates with the head through a relatively small duct or aperture 6, which leads tangentially into a cylindrical chamber 7 in the head. This duct may be produced by placing the head in a jig and drilling from the aperture 5 through the head at an angle to the axis of the stem 2, or if desired, it may be drilled parallel to the axis of the stem 2 and offset sufficiently to enter the chamber tangentially to its periphery as above de-

scribed. The cylindrical chamber 7 is provided with an end wall 8 having a central circular outlet 9.

The chamber 7 may be formed by boring through the head along an axis at right angles to the axis of the stem 2. Desirably a larger boring tool, or an enlarged section of the boring tool, is employed to counter bore a portion of the distance through the head. The counter bored portion desirably is provided with screw threads 10 to engage the complementary screw threads upon an inlet member, which will hereinafter be described.

The end of the counter bored section desirably is provided with a tapered or conical shoulder 11, which merges into the wall of the chamber 7, forming a seat for the end of the inlet member.

The inlet member 12 may also be formed as a solid of revolution, and turned upon an automatic machine, such as a screw machine. Desirably it is provided with a screw-threaded end portion 13, adapted to be engaged by a suitable union for coupling the same upon a liquid supply pipe, such as a branch of a water main. It also desirably is provided with an angular portion 14, adapted to be engaged by a wrench. The portion of the inlet member which enters the counter bored portion of the head, is provided with screw threads 15 complementary to the screw threads 10, and with a shoulder 16 complementary to the tapered shoulder 11 in the head. The end portion 17 of the inlet member is of smaller diameter, and preferably tapered, and terminates in a preferably tapered nozzle 18, which extends into the outlet 9 of the head. The inlet member is provided with an axial aperture 19, which communicates with an axial duct 20 extending through the nozzle portion. The shoulder 11 in the head and the shoulder 16 upon the inlet member are so disposed that when said shoulders are in engagement, the nozzle will be properly correlated with reference to the outlet, to cause the vaporizer to operate at its highest efficiency at predetermined pressures of the gaseous fluid under pressure and the liquid.

In the present invention, the necessity for great accuracy is eliminated in certain parts, such as the threaded portions, which in the old construction were necessarily air-tight and consequently had to be made up to fit very tightly. In the present construction, the seating of the shoulder of the inlet member upon the complementary shoulder in the head when a screw threaded connection having reasonable tolerance is employed, produces an effective seal against leakage through the thread, and at the same time accurately centers the water inlet member so that it registers properly with the outlet. This is particularly true where the should-

ders are bevelled, as illustrated in the accompanying drawings. By reason of this construction, very much greater tolerance in the threaded portions of the inlet member and head is permissible so that, whereas in the old construction the fit between the threaded portions was such as to require screwing in with a wrench, in the present construction, a tight seating between the shoulders may be produced by screwing up the parts by hand.

The shoulder inlet member and the complementary shoulder upon the seat also constitute surfaces for gauging and jiggling by means of which it is possible so to correlate the length of the inlet tip and the depth of the air chamber that the relative position of the tip with reference to the outlet when finally assembled, can be positively determined. This feature makes it possible to manufacture duplicate and interchangeable parts in unlimited quantity, and at the same time secures the advantage that when assembled, the device can assume and will function in one position only, in which the relative sizes and positions of the parts will always correspond to predetermined capacity, and will assure a maximum efficiency. This is very important, for it will be understood that a very slight change in the lateral position of the nozzle in relation to the air chamber outlet makes a very appreciable change in the rate at which the air escapes from the chamber in the head, and in the suction which determines the rate of flow of the water, and therefore in the amount of air consumed and of the amount of water atomized, and of the efficiency of the vaporizer,—that is, the fineness of the atomized spray.

Experience has proved that in the previous construction, the head must be very carefully adjusted by turning the inlet member in and out with a wrench to its position of best efficiency, and unless maintained in that position, serious changes in evaporative capacity quality of spray, and air consumption would result.

In vaporizers of the present construction, different sizes of outlets upon a predetermined graduated scale may be employed to secure different capacities, so that the finished article can be and must be, when assembled, operated at the predetermined capacity and efficiency for which it was originally designed.

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

1. A vaporizer comprising a head having a circular chamber, provided with a tangential inlet for the admission of a gaseous fluid under pressure, and an axial outlet at one end of the chamber, an inlet member for a liquid, mounted on said head, having a

tapered nozzle extending through said chamber into and concentric with said outlet, and means within said head for positioning said nozzle concentrically and in a predetermined and fixed correlation to said outlet and acting to provide an air-tight joint.

2. A vaporizer comprising a head having a circular chamber, provided with a tangential inlet for the admission of a gaseous fluid under pressure, an axial outlet at one end of the chamber, an inlet member for liquid mounted on said head, having a tapered nozzle extending through said chamber into and concentric with said outlet, and engaging shoulders within said head and upon said liquid inlet member located at a distance from said outlet for positioning said nozzle concentrically and in a predetermined correlation to said outlet and acting to provide an air-tight joint.

3. A vaporizer comprising a head having a circular chamber, provided with a tangential inlet for the admission of a gaseous fluid under pressure, and an axial outlet at one end of the chamber, a counter-bore co-axial with said chamber, having a screw-threaded wall and presenting a shoulder at its junction with the wall of said chamber, an inlet member for a liquid having a screw-threaded portion engaging the screw-threaded wall of said counter bore with tolerance, a tapered nozzle of reduced diameter extending through said chamber concentrically into said outlet, and a shoulder complementary to the shoulder on said head, so located as to position said nozzle concentrically and in a predetermined correlation to said outlet.

4. A vaporizer comprising a head having a circular chamber, provided with a tangential inlet for the admission of a gaseous fluid under pressure, and an axial outlet, a counter-bore co-axial with said chamber, having a screw-threaded wall presenting a conical shoulder at its junction with the wall of said chamber, an inlet member for a liquid having an axial duct and provided with a screw-threaded portion engaging the screw-threaded wall of said counter bore, a tapered nozzle of reduced diameter extending through said chamber concentrically into said outlet, a conical shoulder on said inlet member complementary to the shoulder within said head, so located as to provide a predetermined correlation between the effective area of the duct through said nozzle and that of said outlet and acting to position said nozzle accurately concentrically of said outlet and to provide an air-tight joint.

5. A vaporizer comprising a stem and a head formed as a solid of revolution, an axial aperture in said stem, a cylindrical chamber in said head having its axis normal to the axis of said stem and one end pro-

vided with an axial outlet, a port leading from the aperture in said stem tangentially into said chamber, a counter bore of larger diameter, extending into said head co-axial with said chamber, presenting a tapered shoulder at its junction with the wall of said chamber, an inlet member for a liquid also formed of a solid of revolution, provided with a portion to fit said counter bore, a shoulder complementary to the shoulder in said head, and a tapered nozzle of relatively smaller diameter extending through said chamber concentrically into said outlet, said shoulders being so positioned when engaged as to provide a predetermined correlation between the effective area of the passage through said nozzle and that of said outlet to position said nozzle accurately concentrically of said outlet and to provide an air-tight joint.

6. A vaporizer comprising a spheroidal head having a stem provided with an external screw-threaded base formed as a solid of revolution, a cylindrical chamber in said head, having its axis normal to the axis of said stem and provided with an axial outlet, a port leading through said stem tangentially into said chamber, a counter bore extending into said head co-axial with said chamber presenting a tapered shoulder at its junction with the wall of said chamber, an inlet member also formed as a solid of revolution, having a screw-threaded connection with the wall of said counter bore and provided with a tapered shoulder complementary to the tapered shoulder of said head, and a tapered nozzle of relatively smaller diameter extending through said chamber concentrically into said outlet, the shoulders on said head and inlet member being so located when in engagement as to provide a predetermined correlation between the effective area of the passage through said nozzle and that of the outlet.

7. A vaporizer head comprising a gaseous fluid delivery member and a concentric, juxtaposed, conoidal liquid delivery member having respective outlets of predetermined area, and complementary positioning means upon said members within said head acting to position said liquid delivery member concentrically of said gaseous fluid delivery member and operable when engaged to establish a relation between the outlets of said members, which will produce a predetermined capacity of vaporization at a predetermined gaseous fluid pressure.

8. A vaporizer head comprising a gaseous fluid delivery member and a concentric, juxtaposed, conoidal liquid delivery member having respective outlets of predetermined area, and shoulders on said members having complementary surfaces, which when engaged form an air-tight joint, position said liquid delivery member concentrically of said

gaseous fluid delivery member and operable when engaged to establish a relation between the outlets of said members which will produce a predetermined capacity of vaporization at a predetermined gaseous fluid pressure.

9. A vaporizer head comprising a member having an outlet for a gaseous fluid under pressure, and a complementary member having a conoidal nozzle provided with an outlet for a liquid adapted to be located concentrically in juxtaposition to the outlet in said gaseous fluid delivery member, and means on said respective members having complementary surfaces, which when engaged form an air-tight joint, position said liquid delivery member concentrically of said gaseous fluid delivery member and operable when engaged to establish a relation between the outlets of said members which will produce a predetermined capacity of vaporization at a predetermined gaseous fluid pressure.

10. A vaporizer head comprising a member having a circular chamber provided with a tangential inlet for the admission of a gaseous fluid under pressure and an axial outlet, a counterbore co-axial with said chamber having a screw threaded wall presenting a conical shoulder at its junction with the wall of said chamber, a concentric juxtaposed conical liquid delivery member having an axial duct and provided with a screw threaded portion engaging the screw threaded wall of said counterbore and provided with a tapered nozzle of reduced diameter extending through said chamber concentrically into said outlet, a conical shoulder on said inlet member complementary to the shoulder of said counterbore acting to position said nozzle accurately concentrically of said outlet and to provide an air-tight joint.

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

HERMAN FREDERICK SIMON.