June 28, 1949. F. S. ABBOTT 2,474,565

VAPORIZER

Filed Nov. 13, 1946

Fig. 1.

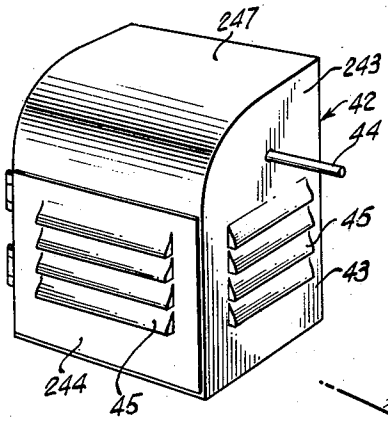


Fig. 2.

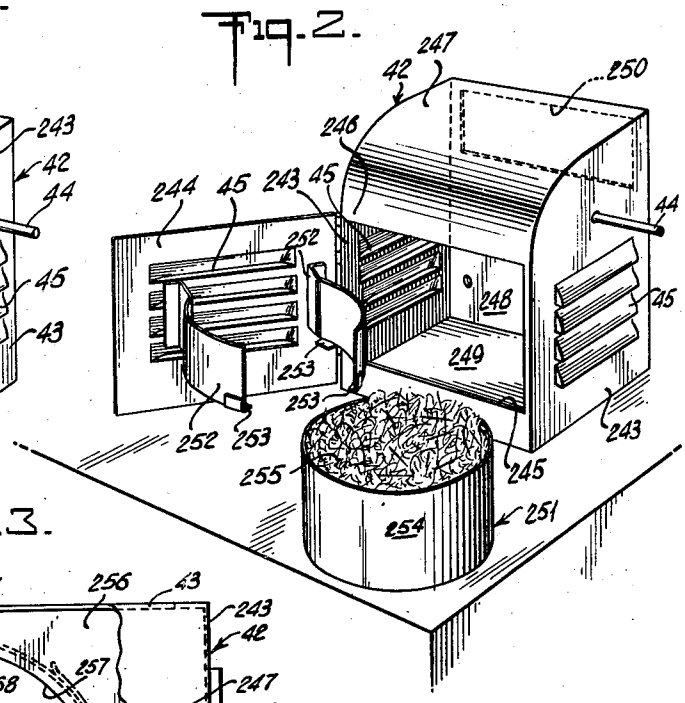


Fig. 3.

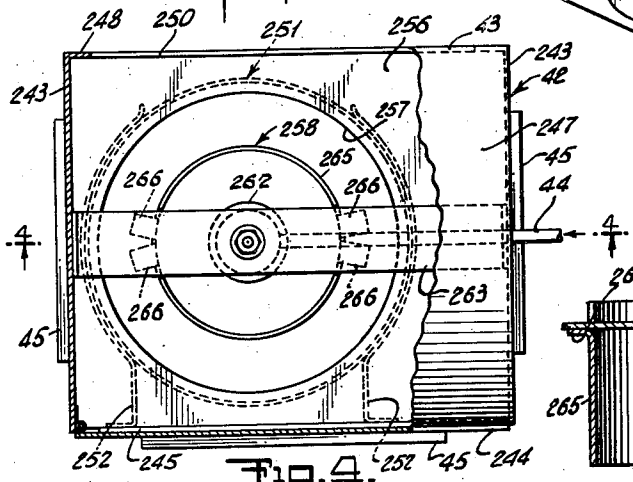


Fig. 5.

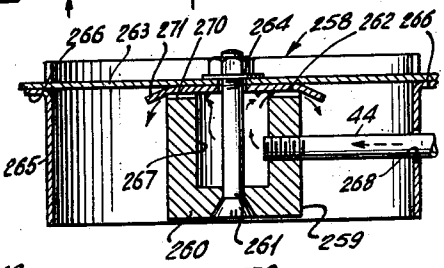


Fig. 4.

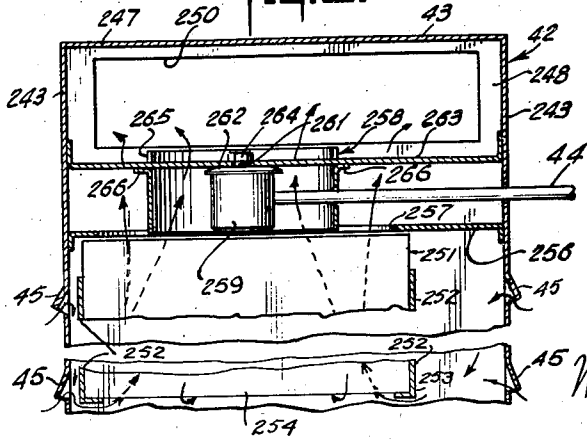
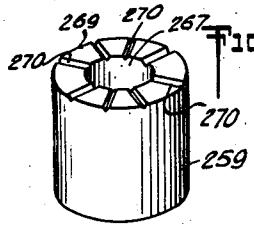


Fig. 6.



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Patented June 28, 1949 2,474,565

UNITED STATES PATENT OFFICE

2,474,565

VAPORIZER

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Application November 13, 1946, Serial No. 709,449

3 Claims. (Cl. 261—98)

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The present invention relates to vaporizers and, more particularly, to such devices adapted to convert forced or pumped liquid into vapors to be diffused into or entrained in passing currents of gaseous medium.

A general object of the present invention is to provide such apparatus which is of simple and economical construction and which effectively diffuses or converts fed liquid, such as spurts or pulses thereof, into vapors in a path for currents of gaseous medium, such as air, so that the latter may effectively entrain the vapors for purposes of humidifying the gaseous medium or air or effectively mixing therewith vapors of freshening, deodorizing, or disinfecting liquids, or the like, while efficiently assuring maintenance in operative condition under trying circumstances of use.

A more specific object of the invention is the provision of such vaporizer apparatus which is characterized by means effectively providing for passage of gaseous medium or air therethrough along a defied path, spray means to break up fed liquid into mist or droplets in the path and a porous mass in the path presenting extended surfaces to be moistened by the droplets and thus effectively present the moisture for transfer to currents of gaseous medium or air passing over the extended surfaces.

Another object of the present invention is to provide a spray head for such vaporizer apparatus which is featured by a supply chamber for accumulation and maintenance therein of a body or pool of liquid effectively to keep moist walls of tiny outlet passages efficiently to minimize or avoid clogging of the latter during intervals between intermittent supply.

A further object of the invention is the provision in such vaporizer apparatus of associated spraying means and baffling structure to assure economical delivery of mist and/or droplets of liquid to a porous mass having tortuous air passages therethrough defined by extended surfaces adapted to be moistened by the mist and/or droplets for efficient conversion into vapors to be picked up by air as it is forced through the porous mass.

A still further object of the invention is to provide a structural embodiment of the invention which is readily constructed and permits efficient use and operation thereof.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

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For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is an elevational perspective of an embodiment of the vaporizer of the present invention;

Fig. 2 is an elevational perspective of the unit shown in Fig. 1, with the casing shown open and resting with a cartridge unit upon a supporting surface;

Fig. 3 is an enlarged top plan view, with parts broken away and in section, of the device shown in Figs. 1 and 2;

Fig. 4 is an elevational section taken substantially on line 4—4 of Fig. 3, with parts broken away;

Fig. 5 is an elevational section on an enlarged scale of spray head structure shown partly in elevation and partly in section in Fig. 4; and

Fig. 6 is an elevational perspective of an element of the spray head structure shown in Fig. 5.

The embodiment of the vaporizer of the present invention, shown by way of example in the accompanying drawing, in which like numerals identify similar parts throughout, may be used to advantage in any field of use where it is desired to convert liquid to vapors and entrain or diffuse the latter into passing currents of gaseous medium. That vaporizer unit 42 is particularly adapted for use in air conditioning systems for converting water to water vapor for humidifying or diffusing vapors of air-freshening liquid, or other liquid, into circulated air, and is suited to installation in such a system by attachment of its hood 43 to the fan section of the air conditioning equipment, or to any other type of means for forcibly circulating air. Of course it is understood that provision may be made for passing air in either direction through the hood 43 so long as there are thereby created currents of air past a liquid delivery structure therein so that vapor from the liquid may be picked up by the passing currents. The embodiment shown in Figs. 1 to 6, inclusive, is particularly adapted for passage of air currents into the hood or casing 43 through louvered openings 45—45 in the two side panels 243, 243 thereof and a hinged door 244, closing an opening 245 in front panel 246 thereof. The hood has a top 247 curved at the front to merge with front panel 246, a back panel 248 and a bottom 249,

In the back panel 248 is preferably provided an outlet opening 250 so that air may be drawn therethrough to create currents up through the hood from the inlet louvered openings at 45—45.

The hood 43 preferably is provided with means for supporting a cartridge 251 of loosely packed material therein for purposes of most effectively dispensing vapors into passing air currents. For this purpose the hinged door 244 preferably supports on the inside thereof a pair of clips 252, 252, each having laterally extending lugs 253 on which the bottom edge of cylindrical cartridge 251 is adapted to rest when snapped into position between the two clips. The cartridge 251 may comprise a cylindrical casing 254 in which is loosely packed a mass 255 of pieces of suitable material which, for example, may be wood excelsior. Casing 254 is in the form of a tube open at both ends to permit through passage of fluid, such as currents of air, from end to end. The hood 43 is internally provided with a laterally extending partition 256 below the outlet opening 250 and that partition has therein a circular hole 257 with which the cylindrical casing 254 of cartridge 251 is to be substantially axially aligned, when the latter is held in close proximity to the partition, by clips 252, 252 with the door 244 closed, as is indicated by dotted lines in Figs. 3 and 4. If desired, a damper may be installed between air inlet louvers 45—45 and outlet hole 250 to control flow of air through the hood 43.

The vaporizer hood 43 is suitably equipped with a dispensing nozzle or spray head unit 258 which, as will be seen from Figs. 3 to 6, inclusive, preferably comprises a cylindrical cup-shaped member 259 having a bottom 260 which is apertured to receive therethrough a headed bolt 261 having its upper end projecting through a hole in a cover plate 262 and a supporting bracket 263 with a nut 264 holding the parts together and on the supporting bracket. The supporting bracket 263 may be a transversely extending strap, as shown in Figs. 3 and 4, having its end secured to the side walls 243, 243 of the hood. A cylindrical shield or spatter ring 265 is supported in any suitable manner about the spray head 259 and may, for this purpose, have diametrically opposed slots with lips 266—266 bent outwardly therefrom and spot-welded to the underside of supporting strap 263.

The cup-shaped head 259 and cover plate 262 together provide a chamber 267 with which communicates an inlet conduit 44 threadably received in a hole in the side of the head and with that conduit extending through a hole 268 in the side of the shield or splatter ring 265. The upper edge 269 of spray head 259 is preferably provided with a plurality of radially extending grooves 270—270 so that, when the cover plate 262 is seated against the top edge, the grooves provide desirable small outlet passages to break up into a spray liquid which passes out therethrough from chamber 267 when delivered to the latter under pressure by inlet conduit 44. The spray emitting from passages provided by grooves 270—270 preferably is diverted downwardly by the turned down edge 271 of cover plate 262, whereby the latter serves as a baffle to assure impingement of the sprays somewhat medially of the inner wall of shield or ring 265 and down toward the cartridge 251 therebeneath.

In operation of the vaporizing unit 42 pulses or spurts of liquid may be delivered by any suitable pumping means through inlet conduit 44 to the chamber 267. The liquid under pressure in the latter will be delivered as a plurality of sprays through passages provided by grooves 270—270 to be diverted downwardly by the turned down edge 271 of baffle cover plate 262. The provision of the chamber 267 assures the build-up and maintenance of a supply pool immediately preceding the spray grooves 270—270. This is an important feature since, as has been found in the development of the present invention, it minimizes tendency for the tiny spray grooves 270—270 to clog in service. A spray head which is provided with very fine outlet grooves to break up discharged liquid into sprays will, if not equipped with the pool-maintaining chamber, eventually clog in intermittent service even though the sprayed liquid be tap water. Fine particles of foreign matter and even dissolved salts and minerals will build up deposits on the groove or outlet passage walls as the moisture in the grooves or outlet passages is permitted to evaporate and dry away between discharge spurts or pulses, when liquid is fed to the spray head intermittently as pulses with intervening rest intervals of appreciable duration. The supply pool keeps the grooves or outlet passages moist or wetted tending to eliminate or minimize such clogging build-up of deposits.

In the embodiment shown by way of example in the drawing the supply conduit 44 is shown let into the side of the head 259 below the outlet grooves 270—270 and thus, if pressure on the liquid in the conduit is relieved between pulses of supply, conditions may obtain tending to lower the surface of the supply pool in chamber 267 to below the inlet ends of the grooves. However, vapors of the liquid in chamber 267 and creepage of moisture along the chamber walls will tend to keep the outlet grooves moist, particularly during short non-delivery intervals between rather frequent supply pulses. Further, for services where rather long rest intervals may intervene supply pulses the wetting function of the supply pool in head chamber 267 may be enhanced by provision of a check valve in supply conduit 44 or the formation of a loop bend in the latter having the top thereof at an elevation at least as high as outlet grooves 270—270, where the supply means is lower than the spray head.

The shield or ring 265 assures that substantially all liquid delivered in the form of a spray from the spray head 259 will pass down through hole 257 into the loose mass 255 in cartridge 251. When suction is applied to outlet hole 250 in the back panel 248 of the hood, air currents will be drawn through louvered openings at 45—45 up through cartridge 251 there to pick up vapors of the liquid sprayed into the mass. As the liquid is sprayed down into the excelsior mass 255 it is brought into intimate contact with the upwardly passing air to assure efficient diffusion of vapors into the air. With proper care a density of the packed mass of excelsior 255 may be attained which permits sufficient passage of air therethrough while retarding downward passage of the liquid, so as to avoid wasteful dripping. If, however, the rate of delivery of the liquid to the vaporizing cartridge 251 should happen to be more rapid than the rate at which it can be converted to vapor and picked up as such by upwardly passing currents of air, any consequential dripping may be efficiently collected in the bottom 249 of the hood 43 which together with the side walls 243, 243, bottom portions of front wall 246 and back wall 248, forms a collecting pan. This pan may be suitably connected to a discharge pipe

which may conduct the excess liquid back to supply, if desired.

Flow of air currents, through the louvers **45—45** into the hood **42**, down to the bottom of open-ended cylindrical casing or tube **254**, up through the cylinder-contained loosely packed mass **255**, and through hole **257** and splatter ring **258** to outlet aperture **250**, is indicated by arrows in Fig. 4. In that figure, it is shown that in the preferred form, the open bottom end of cylindrical tube **254** of cartridge **251** is preferably positioned, by resting upon lugs **253—253** of supporting clips **252, 252**, substantially opposite the louvered openings **45—45** third from the top down, since in that figure in any one set of four louvers in a vertical bank, the top first and the third from the top down are shown, with the second and fourth from the top being omitted for purposes of clarity and accuracy in disclosure.

It will thus be seen that the objects set forth above, among others made apparent in the preceding description, are efficiently attained and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. A vaporizer comprising, in combination, a hollow casing, partition means dividing said casing into upper and lower compartments and having an aperture therein for passage of gaseous medium, said casing having inlet and outlet openings for passage of gaseous medium with one communicating with the upper compartment and the other communicating with the lower compartment and an access opening in one side of said casing leading to the lower compartment, door means to close the access opening, support means mounted on the inside of said door means, a porous mass of material having tortuous passages extending therethrough defined by surfaces of extended area, means removably to support said mass on said support means beneath and substantially extending across the aperture in said partition means, conduit means to convey liquid under pressure to within the upper compartment, and spraying means connected to said conduit means and mounted in the upper compartment above the aperture to spray liquid down on said mass.

2. A vaporizer comprising, in combination, a hollow casing, partition means dividing said casing into upper and lower compartments and having an aperture therein for passage of gaseous medium, said casing having inlet and outlet openings for passage of gaseous medium with one communicating with the upper compartment and the other communicating with the lower compartment and an access opening in one side of said casing leading to the lower compartment, door means to close the access opening, support means mounted on the inside of said door means, a porous mass of material having tortuous passages extending therethrough defined by surfaces of extended area, a tube open at both ends and holding said mass therein in loosely packed condition, said tube being detachably received by said support means removably to support said mass beneath and substantially extending across the aperture in said partition means with the tube serving to direct through said mass substantially all of the currents of gaseous medium passing through the aperture, conduit means to convey liquid under pressure to within the upper compartment, and spraying means connected to said conduit means and mounted in the upper compartment above the aperture to spray liquid down on said mass.

3. A vaporizer comprising, in combination, a hollow casing, partition means transversely dividing said casing into upper and lower compartments and having an aperture therein for passage of gaseous medium, said casing having an inlet opening in a wall of the lower compartment and an outlet opening in a wall of the upper compartment for passage of gaseous medium into and out of the casing and an access opening in one side of the lower compartment, door means to close the access opening, clip means mounted on the inside of said door means, a tubular shell open at both ends removably supported by said clip means, a porous mass of material having tortuous passages extending therethrough defined by surfaces of extended area loosely packed into said tubular shell to form a cartridge, said tubular cartridge being detachably supported in the lower compartment by sad door means when closed and in a position beneath and substantially extending across the aperture in said partition means with the shell serving to direct through the tortuous passages in said mass substantially all of the currents of gaseous medium passing up from the lower compartment through the aperture to the upper compartment, conduit means to convey liquid under pressure to within the upper compartment, and spraying means connected to said conduit means and mounted in the upper compartment above the aperture to spray liquid down on said mass.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
489,450	Bentley	Jan. 10, 1893
1,543,760	Fondrey	June 30, 1925
2,095,539	Bechowsky	Oct. 12, 1937
2,130,810	Munz	Sept. 30, 1938
2,262,384	Cooper	Nov. 11, 1941
2,343,804	Salemme	Mar. 7, 1944

FOREIGN PATENTS

Number	Country	Date
134,256	Great Britain	Oct. 27, 1919