V. SLATER.

AIR DIFFUSION MACHINE.

APPLICATION FILED JAN. 3, 1919.

1,346,471.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

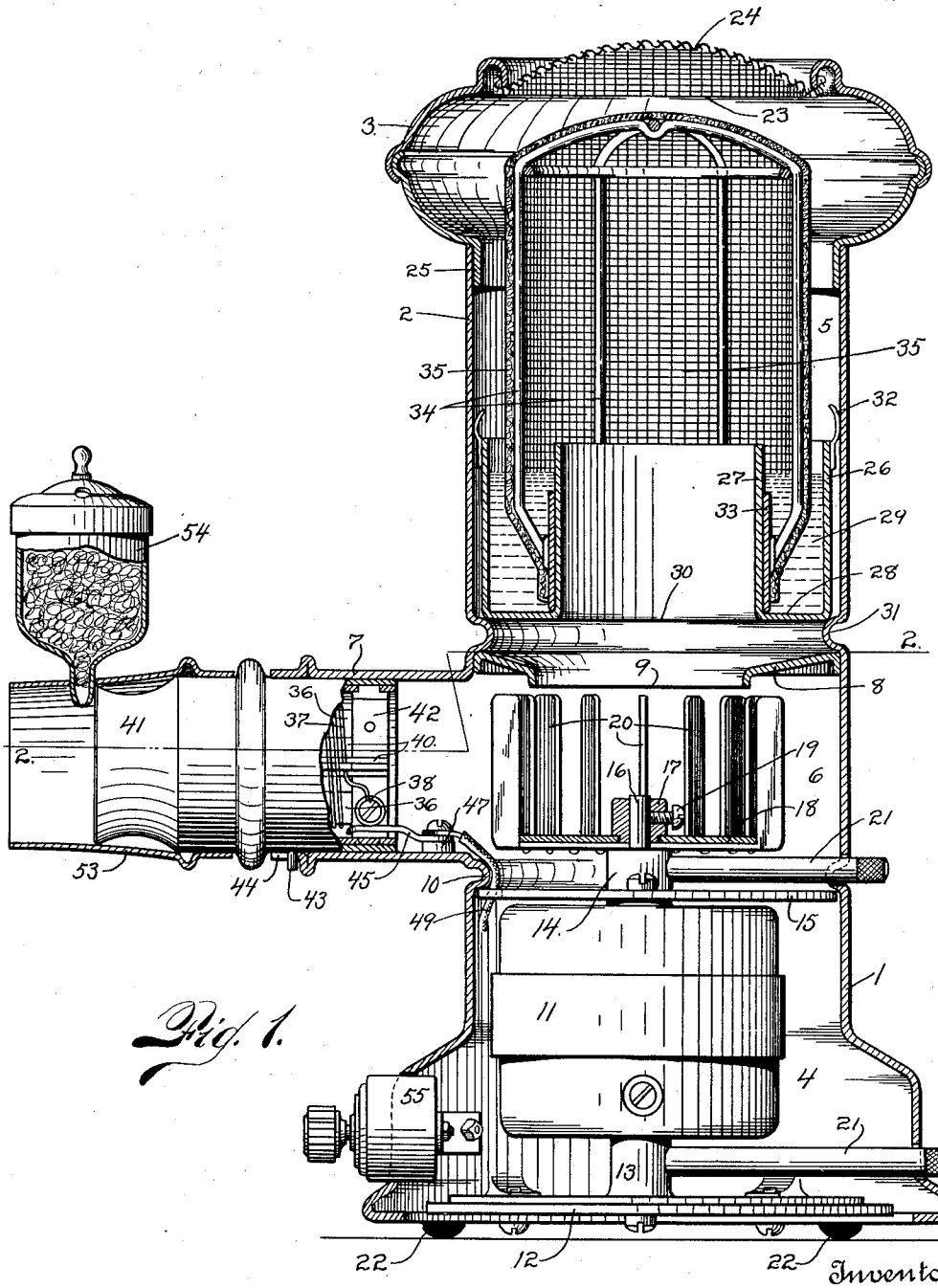


Fig. 1.

Witnesses
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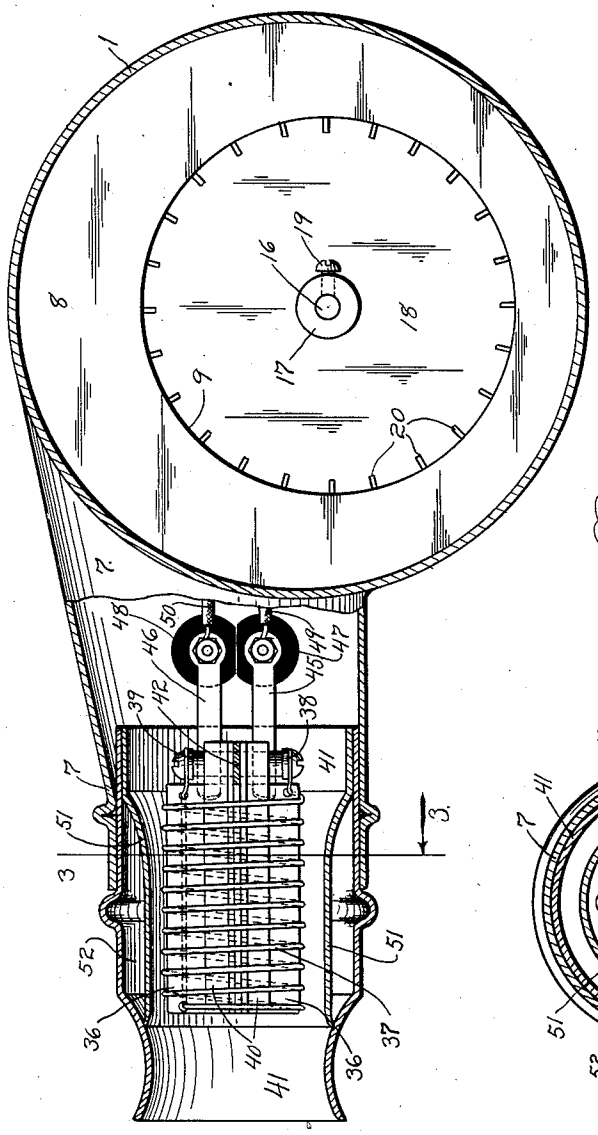


Fig. 2.

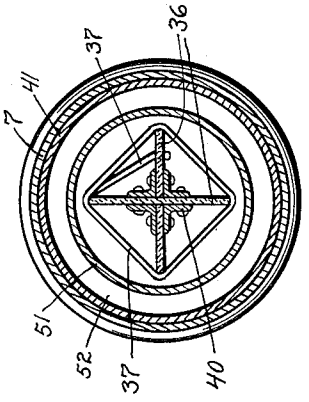


Fig. 5.

Witnesses
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UNITED STATES PATENT OFFICE.

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AIR-DIFFUSION MACHINE.

1,346,471. Specification of Letters Patent. **Patented July 13, 1920.**

Application filed January 3, 1919. Serial No. 269,399.

To all whom it may concern:

Be it known that I, VERN SLATER, a citizen of the United States, formerly of Denver, Colorado, and now residing at Iowa City, in the county of Johnson and State of Iowa, have invented certain new and useful Improvements in Air-Diffusion Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to air diffusion machines of a portable type, and which are particularly adapted for the dissemination or circulation of the air of rooms or like closed places, for obvious purposes, although with proper attachments they may be employed with equal advantage in many other relations.

In the prior art, including inventions of my own, somewhat analogous machines are disclosed for diffusing medicated, deodorizing, or perfumed air, cooled, heated, or in a humidified state, and in this instant case I make no especial claims to any such broad features *per se*. Nor do I make any claim to an electrical heater as such, even though one of its elements is equipped with a properly controlled heating unit of any preferred suitable type, the present invention residing in a unitary air diffusion machine and the construction, arrangement and combination of its elements themselves; and this notwithstanding that replaceable units have heretofore been employed in accomplishing separately the functions of delivering either cool or humidified air or dry heated air, regardless of such air being medicated, deodorized, or perfumed.

It is now well understood that reasonably humid air, cool or heated, is more efficacious, in point of healthy room service, than cool dry air or heated dry air, and in the latter instance a reason is assignable for the not infrequent custom of placing a pan of water upon the top of a radiator or other dry heating unit, for giving off a certain amount of moisture. Under high authority, it is likewise fully recognized that where the air in a room is comparatively humid, a desired warmth may be attained at a substantially lower actual temperature than if the air is quite dry. That is to say, one feels warmer if the air is humid, for instance, at a temperature of 68° than if it is real dry and the temperature registers 72°. Thus not only may healthful conditions be augmented, but also a substantial conservation of the heat generating fuel may be provided for.

To this end a primary feature of my present improvements resides in the particular novelly combined arrangement of elements and their functional association whereby, without their replacement or substitution, they are so disposed, relatively to each other in the machine, that the humidifying unit may be caused to function independently of the heater unit, for delivering moistened cool air, or conjointly therewith for delivering heated moistened air, while with the humidifying unit removed, for certain purposes as where a tube is attached for hair drying or the like, cool dry air or heated dry air may be delivered as desired.

Another important object resides in the particular manner of constructing the delivery nozzle of the machine, which nozzle contains the heating unit, whereby it will be maintained cool, while delivering an intensive heat, so that the machine as a whole has no exposed part or portion liable to burn one by accidental contact therewith.

A further object is to provide such a machine, which is not only portable and of a compact and ornamental character, but which is also simple in construction, assembly, and operation; durable and efficient in action; and comparatively inexpensive to manufacture.

Other objects and advantages of the improvements, together with the wide range of uses in its application, will be so clearly apparent, as incidental to the following disclosure, that it would be mere surplusage to more specifically refer to them initially, and with this general statement, reference will now be had to the accompanying drawings, illustrating a preferred embodiment of the invention, in which drawings—

Figure 1, is substantially a central sectional view, taken in the vertical plane of the delivery nozzle, certain elements of the machine being shown in elevation;

Fig. 2, is a horizontal sectional view, taken along the line 2—2 of Fig. 1, and with the perfuming, deodorizing, or medicating cup removed; and

Fig. 3, is a vertical sectional view, through the delivery nozzle and its contained heater

unit, along the plane of the line 3—3 of Fig. 2.

The portable casing may be assembled from standardized sectional units, but in the drawings it has been shown as of integral formation, comprising a hollow base 1, a superposed open-ended tubular continuation or extension 2, and a surmounting hood or cowl top 3 therefor, the whole providing a lower base chamber 4, an upper air receiving chamber 5, and an intermediate, more or less restricted, suction chamber 6, in substantially open communication with said air chamber 5, and provided with an air outlet or delivery nozzle 7 projecting peripherally therefrom, the several chambers being in direct vertical alinement.

The hollow base 1 is open at its bottom, and at the top of the chamber 6 there is provided the internal deflector element 8, substantially apertured centrally, as at 9, and adapted to direct the incoming passage of air sucked into the intermediate chamber 6.

The nozzle 7 extends laterally from the periphery of this latter chamber wall, immediately below the deflector 8, and the outlet opening preferably extends to the top of the lower chamber 4, an internal bead or rim 10 being formed at substantially that position, for a purpose later referred to.

An electric motor, indicated conventionally at 11, is located in the chamber 4, and may be mounted on a base closure element 12, detachably secured to the casing by stud bolts, a lower journal bearing 13 being centrally supported thereby, and which may comprise a hollow boss element on the motor casing, similar to an upper journal bearing boss 14 mounted centrally of a spacing and division plate 15, adapted to rest upon the upper end face plate of the motor casing, and engage beneath the rib 10. The plate 15 not only provides means for holding the motor in its proper upright spaced position, but also serves as a baffle to prevent an abnormal suction of air down into the motor compartment.

The ends of the motor shaft are journaled in the bearings 13 and 14, the upper end 16 of the shaft projecting through and above its bearing.

A central hub 17, carried by the base 18 of a suctional fan blower, is secured to the projecting end of this shaft, as by a set screw 19. The base 18 of the fan blower may support any suitable form of vanes or blades, shown as upright spaced peripheral blades 20 suitably attached to the base body, and substantially occupying the whole of the suction chamber 6, providing a central open zone or eye, disposed immediately below the deflector opening 9, thus being adapted to more positively suck in air from the chamber 5, while ejecting the same peripherally, with an equally positive direct force, through the diffusion nozzle 7, which latter is in direct alinement with the peripheral discharge from the suctional blower.

21 simply designate grease tubes or similar lubricating means for the motor shaft bearings, and 22 are base supporting buttons, which are preferably formed of insulating material.

From the immediately preceding description, it will be apparent that the motor, fan, and division plate, may be assembled and inserted or withdrawn from the motor and fan compartments as a whole, when required.

The hood 3 has a large top central aperture 23, which is capped preferably with a cover of gauze 24 or the like, for permitting of the free entrance of air, while at the same time preventing any substantial obstructing substances from being sucked into the machine casing, and the bottom of the hood terminates in an inset depending flange 25, adapted to extend within the upper end of the extension 2 in snug fitting relation.

The humidifying unit itself is of novel structure, the lower end and main body portion of which is adapted to be supported within the upper air chamber 5, while its upper end may project well up into the hood 3.

Generically it consists of a lower liquid container, provided with a vertical framework over which is fitted an absorbent stocking or textile covering, of sufficiently coarse mesh to permit of the free passage of air therethrough, when saturated by the capillary action of the contained liquid in which the lower end of the covering is submerged after the fashion of a wick.

As shown, 26 and 27 designate respectively an outer and an inner peripheral wall of the liquid containing tank, openly spaced at top but joined by an integral bottom 28, providing a liquid containing chamber 29 and the central opening 30, which latter may also have a protecting bottom screen closure if desired. The bottom of the tank is suitably supported immediately above the deflector element 8, as by an internal rib 31, and in order to center and maintain the humidifier rigidly against lateral displacement, I preferably provide the spring elements 32, the sliding resilient engagement of which with the wall of the extension 2 enables the whole unit to be readily withdrawn or inserted, for obvious reasons, as will be evident.

33 designates a base supporting sleeve for the absorbent element of the humidifier, which sleeve is adapted to slidingly engage or fit over the inner peripheral wall 27 of the tank. To this sleeve are fixedly secured the lower ends of non-corrosive spaced arms

34, providing a vertically disposed open frame-work, which is preferably of the contour of an inverted jar, adapted to be snugly incased by the covering or wick-stocking of freely absorptive and open mesh fabric 35, or its equivalent, the whole forming, as it were, a freely absorptive cartridge element, pervious to the unobstructed passage of air therethrough, the lower end of which cartridge is submerged in the liquid of said tank, and is maintained highly moistened by the capillary feed of the liquid, which obviously may be plain water for ordinary humidifying purposes; but evidently the water may be charged with a perfuming agent, for delicate scenting purposes, or even be a solution of much stronger properties for fumigation or deodorizing, or for the medicating of the air of a room, all of which, however, is immaterial with relation to the physical structure of the machine.

This specific arrangement is very desirable, as it provides means for removing the absorbent covering support from the pan proper, for replacing a new covering if desired; but obviously the lower ends of the arms 34 may be secured directly to the inner peripheral wall 27 of the pan, without the interposition of the sleeve 33; and likewise a wire gauze casing support may be employed instead of the open frame-work support composed of the spaced vertical arms 34, which needs no illustration being an obvious expedient.

Referring now to the heater *per se*, no specific novelty being claimed therefor, it may be briefly described as comprising an elongated cruciform structure 36 of mica strips or other insulator material, around which is wound, in spaced coils, a suitable wire 37 of high electrical resistance, the ends of which are connected to terminal posts 38—39, in the nature of laterally disposed contacting studs as will later appear. However, the particular mounting, functioning, and disposition of the heater, relatively to the machine casing, is of the utmost importance, as is likewise the specific formation of the detachable diffusion nozzle, containing the heater.

The cruciform mica structure 36 is rigidly supported by longitudinal angle plates 40, which in turn are held centered in a detachable diffusion nozzle 41 (also of novel structure) by being supported at their inner ends upon a vertical plate 42, mounted within the inner end of the deetachable nozzle; and when this detachable nozzle, with its contained heater, is fitted within the outlet extension 7 of the machine (being centered and guided by the pin and slot elements 43—44, Fig. 1) the lateral terminal stud posts 38—39, of the heater, are caused to ride over, in sliding contact with, a pair of spring terminals 45—46, mounted on insulating terminal posts 47—48 within the extension 7, which latter terminal posts afford proper means for connection with switch controlled circuit wires partly illustrated and designated by the numerals 49—50.

From Figs. 2 and 3, it will be noted that this detachable diffusion nozzle 41 is formed by a double spinning, embodying an outer and an inner shell, the inner shell being designated by the numeral 51, while the two shells are so formed and associated in joined relation as to provide an annular space 52. This annular space is in the nature of an encompassing air-tight chamber enveloping the heater, and may preferably be exhausted of its air to provide a vacuum, for effectively maintaining the nozzle cool at all times, while emitting an intensive heat from its contained heater. Thus in the whole machine there is no exposed heated portion, liable to cause injury by accidental contact therewith, while at the same time the thermal insulating space 52 negatives the loss of any heat by direct radiation, so that the heated air, positively diffused into the exterior atmosphere, is of the maximum degree, and is only limited by the size of the machine and its heating element, which may be obviously constructed on a larger or smaller scale to meet varying conditions.

The tubular attachment 53, shown at the left in Fig. 1, has no especial bearing on the present invention, but simply illustrates that certain units may be associated with the diffusion nozzle as desired—such for instance as a suitable supply cup 54 (as shown) for containing a perfuming, a deodorizing, a fumigating, or a medicating agent or the like, or even a tubular connection for hair drying or other purposes.

Finally, 55 designates conventionally a suitable electric switch junction box, controlling an electric current through connecting circuit wires (not shown) for operating the motor independently of the heater, and also for shunting a current around the coil of the heater conjointly with the operation of the motor; all of which is sufficiently obvious without tracing out the circuits by an illustration of the specific connections, requiring unnecessary detailed description.

From all of the foregoing, it is believed that the operation of the machine and the several novel features and advantages of the invention will be fairly apparent, but the exact operation may be briefly stated, in sequential order, as follows:—

When it is simply desired to maintain a circulation of air in the room, for dry ventilating and minor cooling purposes, as with the ordinary fan ventilator, the humidifier cartridge may be removed separately or conjointly with its pan unit, and the switch thrown to cause an electric current to flow

around the windings of the motor, causing the same to rotate without affecting the heater coils, whereupon the fan blower sucks in dry air at its eye, through the deflector opening 9, and peripherally discharges the dry incoming air positively through the diffusion nozzle. If the dry air is to be heated, the switch is simply turned another point, causing a shunted current to flow around the coils of the heater, without disturbing the operation of the motor, whereupon the forcibly ejected dry air will become highly heated, in passing through the heating zone within the nozzle, before being diffused into the exterior atmosphere.

When the humidifier unit is in place, which it normally is, the action is similar to that described, but the mounting of the absorptive cartridge in the upper air chamber 5 necessitates the incoming air to pass through all of the exposed pores thereof, whereby the air becomes highly saturated and humidified, the feed of the moistening liquid having already been explained. This is true whether the switch is so set as to cause the motor to operate solely or conjointly with the heater, dependent upon whether moistened cool air is to be delivered, or heated moistened air instead.

Obviously minor modifications might be made without departing from the underlying principles of the invention, and it will be understood, therefore, that I do not limit myself necessarily to the exact details as illustrated and described, excepting as they may come within the purview and scope of the ensuing claims, when fairly interpreted in the light of the specification and understood equivalents.

What I do claim, as patentably novel, is:—

1. An air diffusion machine embodying a portable casing having an enlarged air chamber at one end thereof, an air inlet therefor, an air outlet therefor, and an intermediate chamber provided with means therein operating to draw air through said enlarged air chamber and positively discharge same through said air outlet, the said enlarged air chamber containing a suitably mounted humidifier unit, and the said air outlet having a suitably controlled heater unit directly associated therewith, the several elements coacting to function substantially as described.

2. An air diffusion machine embodying a portable casing having an enlarged air chamber at one end thereof, an air inlet therefor, an air outlet therefor, an intermediate chamber provided with means operating therein to draw air through said enlarged air chamber and positively discharge same through said air outlet, and a diffusion nozzle in open communication with said air outlet as a continuation thereof, the said enlarged air chamber containing a suitably mounted humidifier unit, and the said diffusion nozzle containing a properly controlled heater unit, the several elements co-acting to function substantially as described.

3. An air diffusion machine embodying a portable casing having an enlarged air chamber at one end thereof, an air inlet therefor, an air outlet therefor, an intermediate chamber provided with means operating therein to draw air through said enlarged air chamber and positively discharge same through said air outlet, and a diffusion nozzle in open communication with said air outlet, as a continuation thereof, and formed of an inner and an outer shell joined in air closed spaced relation to provide an annular insulator space, the said enlarged air chamber containing a suitably mounted humidifier unit, and the said diffusion nozzle containing a properly controlled heater unit, the several elements co-acting to function substantially as described.

4. In an air diffusing machine, a portable casing provided with an incoming air chamber at its upper end, an air inlet therefor, an air outlet therefor, and means operating to draw air through said incoming air chamber and positively discharge same through said air outlet, the said air outlet having a suitably controlled heater unit directly associated therewith; in combination with a humidifier unit, suitably mounted within said incoming air chamber, comprising a liquid container formed by a centrally open bottom and spaced inner and outer peripheral walls, providing a central open ended tubular element, an open framework support projecting upwardly from the interior of said container, and a wick-stocking covering for said framework support, the several elements co-acting to function substantially as described.

5. In an air diffusion machine, a portable casing provided with an incoming air chamber at its upper end, an air inlet therefor, an air outlet therefor, and means operating to draw air through said incoming air chamber and positively discharge same through said air outlet, the said air outlet having a suitably controlled heater unit directly associated therewith; in combination with a humidifier unit, suitably mounted within said incoming air chamber, comprising a liquid container formed by a bottom having a central opening and spaced inner and outer peripheral walls, providing an open ended central tubular element, an open framework support mounted on a base support slidingly encompassing said tubular element, and a wick-stocking covering for said framework support, the several elements coacting to function substantially as described.

6. In an air diffusion machine, a portable casing provided with a motor chamber at its

lower end, an incoming air chamber at its upper end, and an intermediate suction chamber confined by a transverse lower divisional partition coöperating with an internal upper deflector partition; in combination with an electric motor in said motor chamber; a suctional fan blower in said suction chamber and coupled with said motor; a detachably supported humidifier unit within said incoming air chamber; an outlet air nipple leading from said suction chamber; and a detachable diffusion nozzle directly mounted in open communication with said outlet nipple as a continuation thereof, the said diffusion nozzle containing a properly controlled heater unit, and the several elements coacting to function substantially as described.

In testimony whereof I affix my signature.

VERN SLATER.