

March 14, 1933.

W. W. SOMERSALL

1,900,956

PORTABLE HEATER

Filed April 2, 1932

2 Sheets-Sheet 1

Fig. 1.

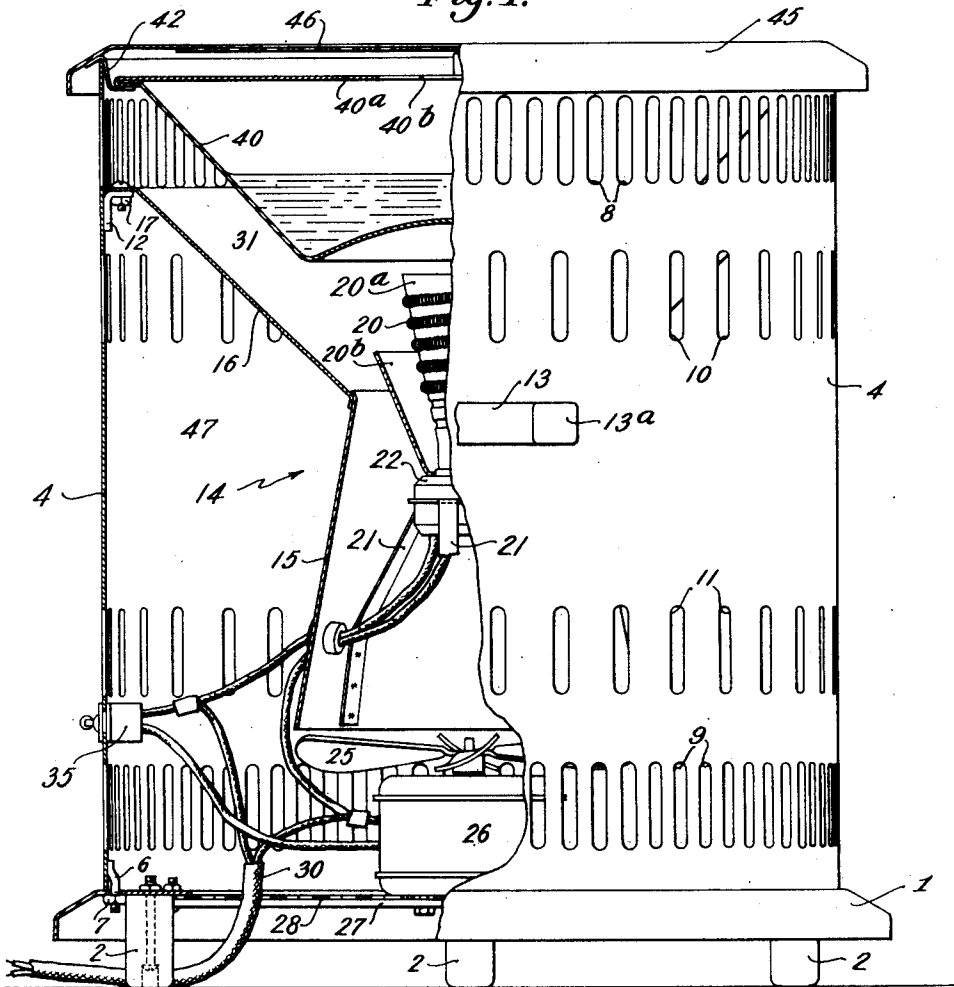


Fig. 2.

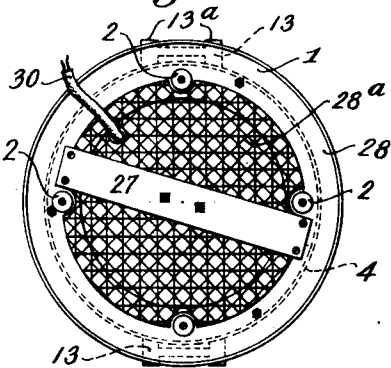


Fig. 3.

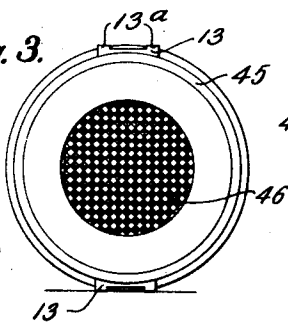
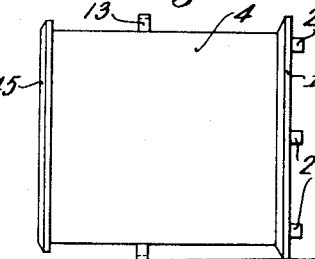


Fig. 4.



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Fig. 5.

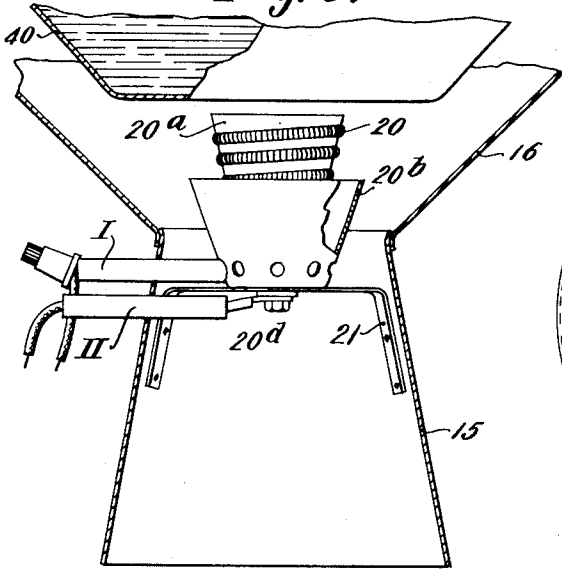


Fig. 6.

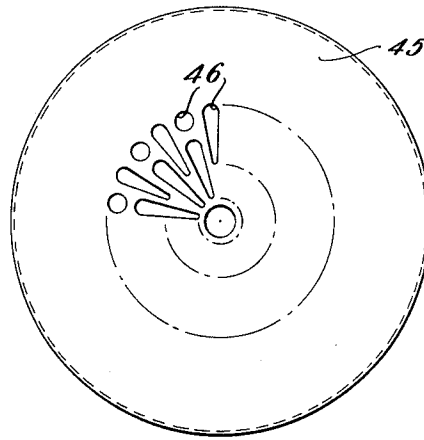


Fig. 8.

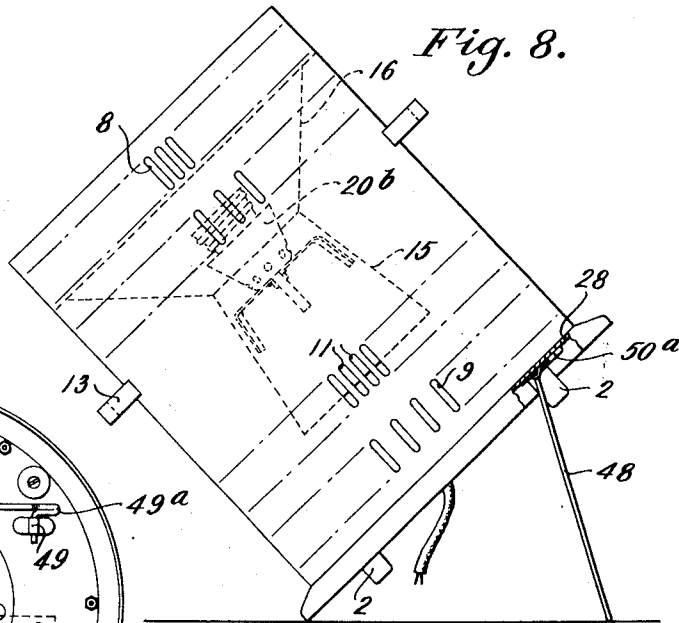
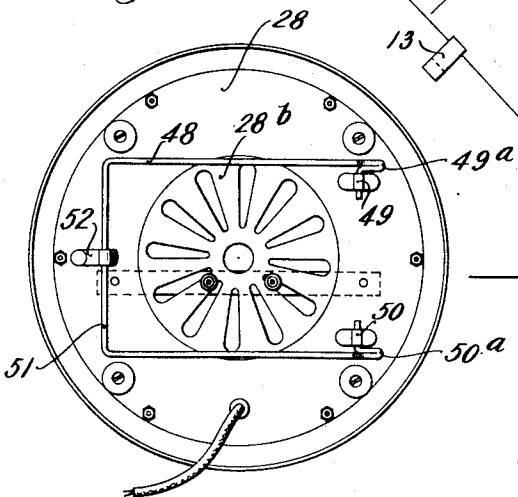


Fig. 7.



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UNITED STATES PATENT OFFICE

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PORTABLE HEATER

Application filed April 2, 1932. Serial No. 602,707.

This invention relates to air conditioning apparatus, and more particularly to a moistening and heating device of portable type adapted for household use. It is well recognized that the abnormally dry air of artificially heated rooms or apartments is a contributory cause or augmenting factor in many respiratory diseases. Moreover, physicists point out on the one hand that the over-heating of a room or apartment is the immediate cause of such abnormal dryness of the air, and on the other hand, that the rapid evaporation of moisture from the skin surface resulting from such abnormal dryness of the air produces a sensation of chilliness, apparently calling for even more heat. Thus, the dry condition of the air is not only detrimental to health, but is also uneconomical from the heating standpoint, since it makes the maintenance of abnormally high temperatures necessary for comfort.

While attempts have been made to install air moistening apparatus in permanent heating systems, as well as to provide moistening devices, for example, atomizers, independent of the heating systems, such arrangements are usually expensive and in many situations wholly impractical. Within recent years, portable electrical heaters have come into very general use, for example, for heating individual rooms, and as such apparatus is commonly installed in a relatively small and enclosed space, its operation tends rapidly to decrease the relative humidity of the air, so that the undesirable conditions arising from abnormal dryness are commonly associated with the use of such heaters.

One of the objects of the present invention is to provide a device which functions primarily as a heater and which is adapted for use in the same way as the ordinary portable electric heaters now commonly employed, but which is so designed that the heat may be directed predominantly in one direction or generally diffused, as preferred, and so designed that its prolonged operation need not substantially dry the air of the room nor, on the other hand, will the device spray or scatter moisture in its vicinity.

A further object is to provide a portable

heating device of the aforesaid character which, while of simple and attractive design, inexpensive to manufacture, and of desirable construction, is efficient, reliable and quiet in operation. Further objects will be apparent from a consideration of the following description and accompanying drawings, wherein

Fig. 1 is an elevational view illustrating one embodiment of my improved apparatus, partly in section and with parts broken away;

Fig. 2 is a bottom view on a greatly reduced scale;

Figs. 3 and 4 are top and side views, respectively, of the apparatus when tipped into horizontal position for use simply as a heater;

Fig. 5 is a fragmentary vertical section illustrating modified and preferred means for supporting the heating element and directing the heat radiated therefrom;

Fig. 6 is a plan view of a modified form of cover;

Fig. 7 is a bottom plan view illustrating a desirable form of bracket for supporting a heater in inclined position; and

Fig. 8 is a side elevation of a heater disposed in inclined position.

The particular embodiment of the invention chosen for the purpose of illustration is of sheet metal construction and comprises an annular base 1 supported by the legs 2 which may be of rubber or other suitable material. A cylindrical casing or drum 4 is mounted on the base and may be secured thereto by any suitable means as, for example, a plurality of threaded pins or lugs 6 which are soldered or otherwise secured to the casing and project through the base and engage nuts 7. Adjacent to its upper and lower edges the casing is provided with a series of circumferentially spaced openings 8 and 9, respectively, the openings 8 providing a peripheral outlet. Intermediate these series of openings the casing preferably is provided with series of openings 10 and 11 and with handles 13. Preferably, though not necessarily, each handle comprises the spaced projections or lugs 13^a adapted, as hereinafter described, to constitute legs to support the heater and keep it from rolling when in sub-

stantially horizontal position, as illustrated in Fig. 4.

A plurality of spaced brackets 12 are soldered or otherwise secured to the inner side of the casing adjacent to the lower ends of the openings 8. The brackets 12 provide a support for the concentrically disposed flue, designated generally by the numeral 14. The flue preferably comprises a vertically extending upwardly tapered lower portion 15 spaced from the base and the vertical walls of the casing, and a frusto-conical upwardly flaring mouthpiece 16 fixed to the lower part 15, the mouthpiece adjoining the outer casing adjacent to the lower ends of the openings 8 and being secured to the brackets 12 by fastening elements 17.

An electrical heating element, for example, a resistance coil 20, is arranged coaxially with the flue, preferably with the lower end of the element disposed substantially at the plane of the junction of the members 15 and 16. Preferably the coil 20 is wound upon an upwardly flaring insulating core 20^a of porcelain or the like so that the effective diameter of the heating element increases from its lower end upwardly.

The heating element is carried by a support comprising bracket arms 21 fixed to the member 15, and the heating element and its electrical connections may be mounted on the support in any desired manner. If the element be of relatively small capacity, it may have a plug of standard pattern adapted to fit a socket 22 (Fig. 1) carried by the support,—suitable conducting wires being connected to the socket terminals in the usual way. However, particularly when the heating element is of large capacity, I prefer the arrangement specifically shown in Fig. 5, wherein the heating element is permanently fixed in position.

Preferably the apparatus includes a frusto-conical cup 20^b in which the heating element is seated. In Fig. 5 the core of the heating element and the cup in which it is seated are fixedly secured in position by a bolt 20^d (properly insulated) which conveniently constitutes one terminal of the coil 20. Tubular porcelain insulators I and II pass through openings in the member 15, and through these insulators the conducting wires lead to the heating element, one wire being connected to the terminal bolt 20^d and the other passing through an opening in the cup 20^b and being secured to the other terminal of the core 20. The cup 20^b preferably has a series of openings near its bottom to a low air circulation so as to prevent overheating, and this cup is preferably of metal provided with a smooth vitreous enamel surface of a highly heat-resistant character and a good insulator for electricity. Since the surface of the cup is of insulating material, the cup acts as a guard or safety device to prevent

short circuiting of the coil if the latter should break and unwind from its core 20^a, or if the heating element should accidentally tip sidewise.

However, the principal functions of the cup are to deflect the heat coming from the coil, thus preventing the intense heat of the coil from injuring the adjacent metallic parts or from passing downwardly so as to injure the fan or motor disposed beneath it, and, furthermore, its capacity to absorb the high frequency light radiations from the coil and to transform them into heat radiations makes the device very effective for heating the air current which passes up through the annular space between the cup 20^b and the part 16. Moreover, this cup, by reason of its glossy surface, acts as a reflector to direct heat from the coil upwardly against the water receptacle 40.

A fan 25, disposed at the lower end of the flue, is mounted on the shaft of motor 26 which may be secured to any suitable support, such as crossbar 27. Preferably the drum 4 has a bottom 28 provided with a central opening covered by a screen 28^a (Fig. 2) or by a perforated plate 28^b (Fig. 7) extending across the bottom of the casing and not only provides a guard for the fan, but also prevents paper and other articles from being drawn into the flue when the fan is operating. Any suitable electric connections may be provided for controlling the heating element and motor, either independently of each other or otherwise. The particular connections herein shown by way of example comprise the main power line 30, to which both the heating element 20 and motor 26 are connected in parallel, and the toggle switch 35 which is conveniently mounted on the casing and is in series with the motor circuit to provide an independent control for the motor.

A removable water-containing receptacle 40 fits in the top of the casing and normally provides a closure for its open end. This receptacle is of a substantially frusto-conical shape and relatively shallow,—its under surface providing an extended area for heat transfer. The receptacle preferably has a fluid-tight annular cover or rim 40^a having the central opening 40^b for the escape of vapor, and is provided with radially extending hooks or lugs 42 which engage the upper end of the casing to support the receptacle, as shown in Fig. 1. As thus positioned, the bottom of receptacle 40 is in close heat transfer relation to the heating coil 20 and cooperates with the mouthpiece 16 to provide a divergent annular, upwardly sloping delivery passage 31 which communicates with the peripheral outlet defined by the openings 8, the peripheral wall of the member 40 being preferably substantially parallel to the inclined wall of member 16. A cover 45, preferably of an attractive and ornamental de-

sign, fits over the upper end of the casing 4, the cover having perforations at its central part, as shown at 46 (Fig. 3) or 46^a (Fig. 6), to permit the escape of moisture or vapor

5 from the receptacle.
 For supporting the heater in an upwardly inclined position, as shown in Fig. 8. I provide a folding leg 48 having a pair of pivot members journaled in bearing brackets 49 and 50, secured to the bottom 28 of the heater. This folding leg comprises a transverse member 51, normally held against the bottom of the heater by a spring latch 52, but which constitutes a foot for supporting the heater

15 when the leg is swung to the position of Fig. 8,—suitable stops 49^a, 50^a being associated with the pivot members of the leg to limit its swinging movement.
 In the normal operation of the apparatus the receptacle is kept partially filled with water, to which may be added, if desired, a suitable perfume, volatile medicament, fumigant or deodorant. The major portion of the air is drawn in through the bottom of the casing and the openings 9, and a relatively small quantity is drawn in through the openings 10 and 11. Thus a circulation is established through the annular chamber 47 between the casing and flue wall which prevents the accumulation of dead air therein and overcomes any danger of overheating either the mouthpiece or casing. The air drawn into the flue rises through the annular channel surrounding the highly heated cup

20 20^b which radiates heat energy of less than luminous frequency well adapted to heat such moving air particles as do not receive heat by direct contact with the hot surfaces. The inner surface of the cup reflects heat upwardly against the under side of the water receptacle 40, and the latter, as already noted, acts as a deflector for directing the air outwardly into the passage 31. The heated air which is delivered through the openings 8 forms a substantially conical annular stream, having its axis substantially vertical, and this flaring upwardly flowing stream creates a downwardly directed current which strikes the top of the apparatus, picks up the vapor emitted from the receptacle, and then joining the outflowing stream of heated air quickly disseminates the vapor.

When the fan is in motion it produces a swirling action in the air passing up through the flue and outwardly through the passage 31 and the openings 8, so that the air which emerges from the device tends to diffuse rapidly through the room in which the heater is placed.

The receptacle 40 may be left empty or removed from the casing, and the apparatus used solely as a heater. If the receptacle be removed, the heated air is discharged axially through the opening end of the casing. When

thus employed, the apparatus may be tipped horizontally or at an angle, if desired, as shown in Figs. 4 and 8, respectively, the projecting lugs 13^a of one handle or the bracket 45, respectively, then acting as legs to hold the device in selected position and keep it from rolling, so that the air current may be delivered definitely in any desired direction.

As suggested, the apparatus described may be used in the ordinary way merely as a heater, the receptacle 40 being removed or left empty. Furthermore, if desired, the motor 26 may be left idle without cutting off the heat. On the other hand, to supply moisture to the air, it is only necessary to place water in the receptacle 40, when, by reason of the large heating surface afforded, evaporation will take place, usually at a temperature below the boiling point, but in sufficient quantity to maintain the relative humidity in the room or apartment at a reasonably high percent. If during the use of the water receptacle, the heater should be tipped accidentally, the deep rim 40^a of the receptacle prevents the water from spilling from the latter.

As the apparatus is devoid of any mechanical atomizing means, there is no danger of spattering water so as to cause injury to surrounding objects, and while the rate of evaporation is comparatively low as compared with mechanical atomizers, it is sufficient for ordinary purposes. The apparatus thus provided is simple in construction and may be built at relatively small cost, and sold at a price making it available to users who would not be able to buy and install the elaborate air moistening devices which have heretofore been proposed.

While I have shown and described certain desirable embodiments of the invention, I wish it to be understood that various changes in shape, proportion, and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A device of the character described comprising a casing having an inlet at its bottom, said casing being open at its upper end and having openings adjacent to said end providing a peripheral outlet, a longitudinally extending flue within said casing, said flue having a flaring mouthpiece arranged in cooperative relation with the open end of said casing to provide an axial discharge, a heating element disposed in the flue with its lower end adjacent to the small end of the mouthpiece, a fan disposed adjacent to the lower end of said flue, and a removable dished member fitting within the top of said casing, said member providing a closure for the open end of said casing and cooperating with said mouthpiece to define a divergent annular de-

livery passage communicating with said outlet to provide a peripheral discharge.

2. A device of the character described comprising a cylindrical casing having an inlet at its bottom, said casing being open at its upper end and having a plurality of circumferentially spaced openings adjacent to its top defining a peripheral outlet, a longitudinally extending flue within said casing, said flue having a flaring mouthpiece adjoining said casing in a plane adjacent to said peripheral outlet and arranged to cooperate with the open upper end of said casing to provide an axial discharge, a heating element disposed within said flue, a fan disposed adjacent to the lower end of said flue, and a removable dished member fitting within the top of said casing, said member normally providing a closure for said open end and cooperating with said mouthpiece to define a divergent annular delivery passage communicating with said outlet to provide a peripheral discharge.

3. A moistening and heating device comprising a casing having an inlet at its bottom and a plurality of spaced openings adjacent to its top providing a peripheral outlet, a longitudinally extending flue within said casing, said flue having a flaring mouthpiece adjoining the casing adjacent to said outlet, a heating element within said flue, a fan disposed in the lower end of said flue, means shielding the fan from the heating element, and a water-containing receptacle disposed within the top of said casing, the bottom of said receptacle projecting downwardly in close heat transfer relation to said heating element and cooperating with said mouthpiece in providing a divergent annular delivery passage communicating with said peripheral outlet.

4. A moistening and heating device comprising a tubular casing having an inlet at its bottom and a plurality of spaced outlets adjacent to its top providing a peripheral outlet, a longitudinally extending flue within said casing, said flue having a flaring mouthpiece adjoining said casing adjacent to said outlet, an electric heating element within said flue, a fan disposed in the lower end of said flue, and a removable water-containing receptacle disposed within the top of said casing, the bottom of said receptacle projecting downwardly in close heat transfer relation to said heating element and cooperating with said mouthpiece in providing a divergent annular delivery passage communicating with said peripheral outlet.

5. A moistening and heating device comprising a cylindrical casing having an inlet at its bottom and a plurality of circumferentially spaced openings adjacent to its top providing a peripheral outlet, a longitudinally extending flue within said casing, said flue having a concentric conical mouthpiece adjoining said casing adjacent to said out-

let, a frusto-conical cup of insulating material in the upper end of said flue, a heating element within the cup, a fan disposed in the lower end of said flue, and a water-containing receptacle constituting a cover for the top of said casing, said receptacle being frusto-conical shaped and projecting downwardly in close heat transfer relation to said heating element and cooperating with said mouthpiece to provide a divergent delivery passage communicating with said peripheral outlet.

6. A portable heater of the class described having an outer casing, a flue within said outer casing, heating means disposed within the flue, a motor driven fan for impelling air longitudinally of the flue and over the heating means, a removable cover at one end of the casing normally cooperating with the flue to define an annular discharge passage, means normally supporting the casing in upright position so that the air delivery from the discharge passage extends upwardly and outwardly in a substantially conical annular stream whose axis is vertical, and means alternatively operative to hold the casing in substantially horizontal or inclined position, whereby, upon removal of said cover, the air stream from the flue may be definitely directed.

7. A portable heater of the class described comprising a substantially cylindrical casing normally disposed with its axis substantially vertical, a screen at the lower end of the casing, a motor-driven fan in the lower part of the casing, a flue within the casing arranged to receive the air delivered by the fan, heating means within the flue, a fluid receptacle in the upper part of the casing, the under surface of the receptacle cooperating with a portion of the flue to define an annular air passage, the receptacle having an opening in its top for the escape of vapor, and a cover for the casing having an opening through which escaping vapor may pass.

8. A device of the character described comprising a casing having an inlet near its bottom and a peripheral outlet near its top, a concentric flue within said casing, said flue having an inverted frusto-conical mouthpiece whose upper edge adjoins said casing adjacent to said peripheral outlet, a cup fixed concentric with the flue adjacent to the lower end of said mouthpiece, an electrical heating coil within the cup, and a fan disposed in the lower part of the flue, and operative to cause air to flow upwardly through the annular space between the cup and mouthpiece, said cup having a vitreous reflecting surface.

9. A device of the character described comprising a casing having an inlet near its bottom and a peripheral outlet near its top, a concentric flue within said casing, said flue having an inverted frusto-conical mouthpiece whose upper edge adjoins said casing adja-

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cent to said peripheral outlet, a cup fixed concentric with the flue adjacent to the lower end of said mouthpiece, an electrical heating element within the cup, and means for causing air to flow upwardly through the annular space between the cup and mouthpiece, said cup being of inverted frusto-conical form and operative to convert light energy radiated from the heating element into heat radiations for warming the flowing air.

10 10. A device of the character described comprising a casing having an inlet near its bottom and a peripheral outlet near its top, a concentric flue within said casing, said flue having an inverted frusto-conical mouthpiece whose upper edge adjoins said casing adjacent to said peripheral outlet, a cup fixed within the flue adjacent to the lower end of the mouthpiece, and an electrical heating element within the cup, the cup consisting of metal coated with a smooth surfaced heat resistant enamel, the cup being operative to reflect heat energy from the element in an upward direction.

25 11. A device of the character described comprising a casing having an inlet near its bottom and a peripheral outlet near its top, a concentric flue within said casing, said flue having an inverted frusto-conical mouthpiece, a cup disposed concentrically within the flue, an electrical heating element within the cup, and a fan disposed in the lower part of the flue and operative to cause air to flow upwardly along the outer surface of the cup, the cup being operative to shield the fan from the direct heat of the heating element.

30 12. A device of the character described, comprising a casing having an inlet near its bottom and a peripheral outlet near its top, a concentric flue within said casing, said flue having an inverted frusto-conical mouthpiece, a cup fixed within the flue adjacent to the lower end of the mouthpiece, and a heating element within the cup, the inside at least of the cup being of electrical insulating material whereby to prevent accidental short circuiting of the heating current by accidental contact of the heating element with metallic parts of the apparatus.

45 50 Signed by me at Natick, Massachusetts, this thirtieth day of March 1932.

WILLIAM W. SOMERSALL.

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