Dec. 3, 1935. W. G. JOHNSON ET AL 2,023,324

INHALATOR

Filed Sept. 9, 1933

Fig. 2

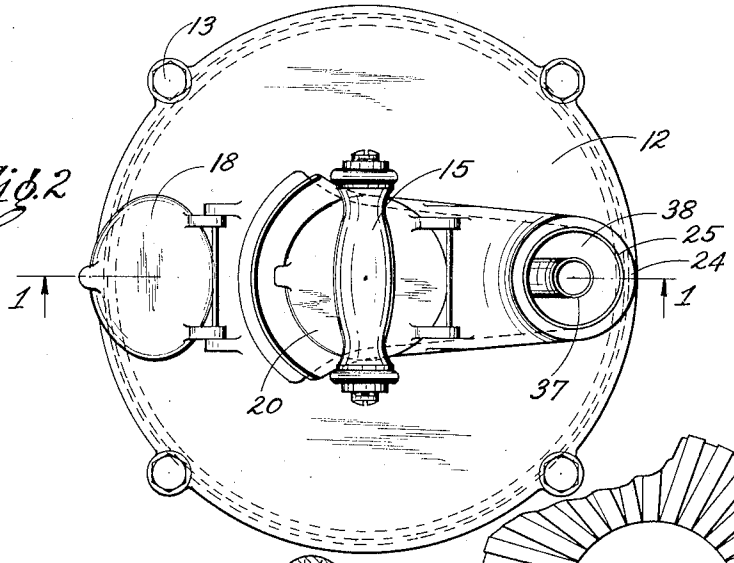
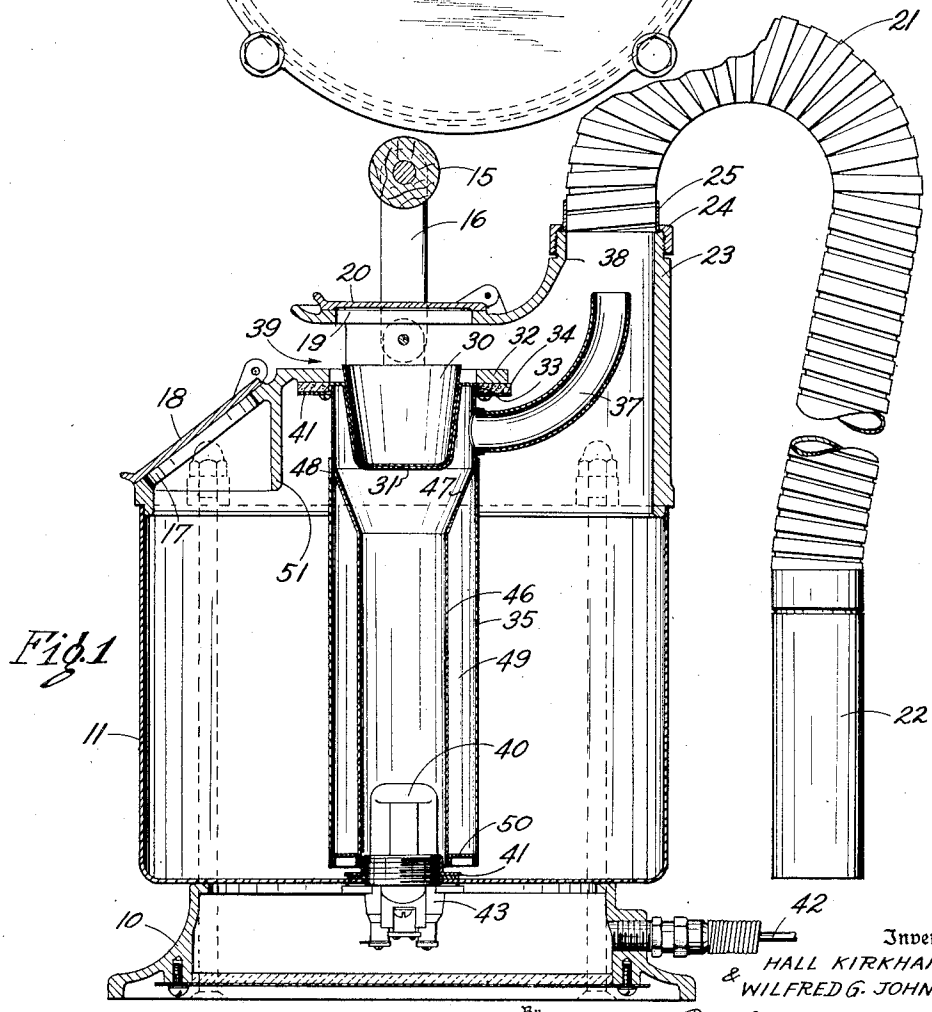


Fig. 1



Inventors
HALL KIRKHAM
& WILFRED G. JOHNSON.

By

Richey & Watts

Attorneys

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INHALATOR

Wilfred G. Johnson and Hall Kirkham, Elyria, Ohio, assignors to Hall Kirkham, receiver of The Colson Company, Elyria, Ohio, a corporation of Ohio

Application September 9, 1933, Serial No. 688,808

9 Claims. (Cl. 128—192)

This invention relates to inhalators or vaporizers such as are used to supply medicated vapors in the treatment of respiratory diseases, and more particularly to electrically heated inhalators in which steam is employed to carry the medicament. The invention will be described in connection with a relatively large inhalator of the type adapted for hospital use, but it is to be understood that our patent is not limited to the particular device disclosed herein.

A general object of our invention is to provide an inhalator which is simple and sturdy in construction, which can be manufactured economically and used conveniently. Another object of our invention is to provide an inhalator in which there is no possibility of the medicine coming in contact with the water in the inhalator. Another object of the invention is to provide an inhalator in which a current of air is drawn across the surface of the cup containing the medicine and in which the air carrying the medicated vapor is later mixed with steam. Another object is to provide an inhalator having a relatively large capacity for water and in which steam can be generated rapidly with the expenditure of a minimum amount of electrical energy. A further object is the provision of an inhalator in which heat is applied to a small portion of water which is isolated from the main supply reservoir.

Further objects and advantages of our invention will become apparent from the following description of a preferred form thereof, reference being made to the accompanying drawing. The essential characteristics are summarized in the claims.

Figure 1 of the drawing illustrates a vertical section through an inhalator made according to our invention; and Fig. 2 is a top plan view of the inhalator shown in Fig. 1, with the flexible supply pipe removed.

The inhalator preferably comprises a base portion 10 which is adapted to support a container 11 which forms a reservoir for the water. The container is provided with a top 12 which may be secured to the container by means of bolts 13 spaced evenly around the periphery of the top and extending down into the base 10. The bolts function to hold the top on the container and to firmly hold the container in position on the base. To provide for carrying the inhalator, a handle 15 may be secured to the top as by a bail 16.

In order to make it possible to conveniently fill the container with water, the top 12 is preferably provided with an opening 17 closed by a hinged lid 18 through which water may be poured directly into the container. The medicine supply may be replenished through an opening 19, normally closed by a hinged lid 20. The top also supports the flexible discharge tube 21 which terminates in a nozzle 22 of a phenolic condensation product or similar material and which is connected to the upwardly projecting portion 23 of the top 12 by means of a threaded collar 24 which engages a flanged sleeve 25 suitably secured to the end of the flexible tube.

We have found that the volatile oils ordinarily used in inhalators of this type will cause the water in the inhalator to form and froth, and a few drops accidentally spilled into the container may cause the water to foam to such an extent that the inhalator will overflow. In order to prevent this, we completely separate the removable medicine container 30 from the water and steam by means of a spun supporting member 31, suspended below the opening 19 from an insulating washer 34, which in turn is carried by the flat annular portion 32 of the top 12. The member 31 is provided with a shoulder 33 to which the upper end of the tube 46 may be suitably secured. This tube, in addition to other functions to be hereinafter described, directs the steam generated within the container against the bottom and around the sides of the member 31. Thus the medicine within the cup 30 is properly heated, although the cup is entirely separated from the steam so that there is no danger of any of the medicine being spilled into the water.

The steam, after being directed against and around the medicine cup supporting member 31 flows outwardly through a curved tube 37, secured to the upper portion of the tube 46, and is discharged into the upwardly extending part 23 of the top 12 directly below the end of the flexible tube 21. The discharge of steam from the curved tube into the space 38 creates a suction effect which draws air into the opening 39 in the top 12 and thus over the medicine cup 30 where the air will pick up the vapors generated by the application of heat to the medicine cup. The air carrying the vapor is thoroughly mixed with the steam as it enters the flexible delivery tube 21 and thus the patient will receive a proper mixture of medicated air and steam.

Inhalators of this type are adapted to contain several quarts of water so that they can be operated for comparatively long periods of time without attention. With such a large water capacity, it is practically impossible to heat the relatively large volume of water rapidly with an

electrical heating element of reasonable size. Accordingly, we have devised a means for isolating a part of the water from the main body of water and by reason of this we are able rapidly to generate steam by means of an immersion heater of reasonable size.

As illustrated in the drawing, the immersion heater 40 projects upwardly through the base of the container 11 and may be secured in place as by a threaded collar 41. Current may be supplied to the heater by a wire 42 suitably supported on the base 10, and the flow of current may be controlled by any convenient type of switch (not shown). Preferably, the heater is provided with a thermostatic shut-off device carried in the base 43 thereof so that no damage will be done if the container is allowed to run dry.

In order to isolate a small volume of water surrounding the heating element from the main body of water in the container, the tube 46 extends downwardly almost to the bottom of the container 11 and is reduced in diameter in its lower portion to closely surround the heating element 40. Surrounding the tube 46, we provide another tube 35 which may be suitably secured to the tube 46 at the upper edge of the conical portion 47 of the tube 46. The two tubes are concentric, thus forming an annular insulating air chamber 49. Water is prevented from entering the air chamber by an annular spacer member 50 disposed at the lower ends of the tubes 35 and 46 and soldered or otherwise secured to the respective tubes. If desired, a vent 48 may be provided in the upper portion of the tube 35, a baffle 51 being employed to prevent water from splashing into the vent when the container is filled.

By reason of the insulating effect of the air space, the relatively small volume of water within the tube 46 can be rapidly brought to a boil without heating the main body of water in the reservoir to any considerable extent. The tube 46 extends rather closely to the collar 41 so as to leave a relatively small passage around the heater at this point. By this construction, loss of heat at the lower end of the tube 46 is substantially prevented, while the space is ample to allow sufficient water to flow from the container 11 into the tube to replenish the supply as the boiling takes place.

It is to be noted that the flexible discharge tube is secured to the one edge of the top 12, whereas the handle 15 is directly in the center. This feature is of practical importance, for by this construction there is no tendency for the operators to pick up the inhalator by means of the flexible tube, which is not designed to carry the weight of the entire device.

From the foregoing description of a preferred form of our device, it will be seen that we have provided a simple and sturdy inhalator or vaporizer which is practically fool-proof and which can be economically manufactured. By reason of the arrangement of the medicine cup, there is no danger of medicine being spilled into the water in the container when the medicine is being replenished. The container can readily be filled with water and the medicine can be replenished or the medicine cup removed for cleaning before substituting another kind of medicine without any trouble and without taking apart the inhalator. By reason of the suction created by the discharge of steam from the tube 37, a sufficient amount of air is drawn across the surface of the medicine cup to pick up the vapors given off by the medicine, and carry them into the delivery tube. Because of the arrangement of the tubes depending from the support for the medicine cup and extending downwardly around the immersion heater, the heat generated by the heating element is efficiently used, and as only a small volume of water is heated to the boiling point, the generation of steam will start very shortly after the electric current is turned on.

In this application we have described only a preferred form of our invention. Various modifications and changes therein will be obvious to persons skilled in the art. It is to be understood therefore that the scope of our patent is not limited by the specific disclosures contained herein, or in any manner other than by the appended claims when given that range of equivalents to which our patent may be entitled.

We claim:

1. In a device of the character described, the combination of a container adapted to carry a supply of water, a heating element extending within the container and supported thereby, a cover member for the container, a support for a medicine cup carried by said cover, and a tubular member carried by said cover and surrounding said support and extending downwardly into said container and surrounding said heating element and adapted to direct the steam generated by said heating element against said support.

2. In a device of the character described, the combination of a container adapted to carry a supply of water, a heating element extending within the container, a cover member for the container, a vapor discharge tube extending from the cover member, an impervious support for a medicine cup carried by said cover, a medicine cup carried thereby, said support being adapted to prevent medicine from being spilled into said container, a tubular member surrounding said support and extending downwardly into said container and surrounding said heating element and adapted to direct the steam generated by said heating element against said support, and means for creating a draft of air from the exterior of the container across the top of said medicine cup and into said vapor discharge tube.

3. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a heating element extending within the container, a tubular insulated member surrounding said heating element and extending above the normal water level in the container and adapted to isolate a relatively small volume of water adjacent the heating element from the main body of water in the container, whereby steam may be quickly generated within the insulated member, a medicine cup disposed in the path of the steam generated in said member, a discharge tube, and means for creating a draft of air from the exterior of the container across the top of said medicine cup and into said discharge tube.

4. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a cover for said container, a medicine cup, means for supporting said medicine cup from said cover and for separating said medicine cup from said container, means carried by said cover for isolating a relatively small volume of water from the main body of water in said container, a heating element supported by said container and disposed within said isolating means whereby steam may be rapidly generated in said small volume of water, means for direct-

ing the steam around the exterior of said medicine cup supporting means.

5. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a cover for said container, a medicine cup supported by said cover, means for separating said medicine cup from said container, means for generating steam in said container and for heating said medicine cup, a discharge tube, and means for creating a draft of air from the exterior of the container across the top of said medicine cup and into said discharge tube.

6. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a cover for said container, a medicine cup supported by said cover, means carried by said cover for separating said medicine cup from the water in said container, a discharge tube for medicated vapor leading from said cover, an insulated tubular member supported by said cover and surrounding said medicine cup and extending downwardly adjacent said heating element for isolating a small volume of water from the main body of water in the container and for directing the steam generated by said heating element around said support, a tube for conducting steam to said discharge tube, and means for creating a draft of air from the exterior of the container across the top of said medicine cup and into said discharge tube.

7. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a heating element mounted in said container, a cover for said container, a medicine cup supported by said cover, means carried by said cover for separating said medicine cup from the water in said container, and an insulating tubular member supported by said cover and surrounding said medicine cup and extending downwardly adjacent said heating element for isolating a small volume of water from the main body of water in the container.

8. In a vaporizer, the combination of a container adapted to contain a relatively large supply of water, a heating element mounted in said container, a cover for said container, a medicine cup supported by said cover, means carried by said cover for separating said medicine cup from the water in said container, said cover having an opening directly above said medicine cup and a hinged lid for closing said opening whereby said medicine cup may be readily filled, said cover also having an opening through which the supply of water in the container may be replenished, and an insulating tubular member supported by said cover and surrounding said medicine cup and extending downwardly adjacent said heating element for isolating a small volume of water from the main body of water in the container and for directing the steam generated by said heating element around said support.

9. In a device of the character described, the combination of a container adapted to carry a supply of water, a heating element extending within the container, a cover member for the container, a vapor discharge tube extending from the cover member, a support for a medicine cup carried by said cover, a tubular member surrounding said support and extending downwardly into said container and surrounding said heating element and adapted to direct the steam generated by said heating element against said support, a tube leading from said tubular member and adapted to discharge steam within the cover member and adjacent the end of said vapor discharge tube, whereby the discharge of steam creates a suction effect within said cover, and an air inlet in said cover, said medicine cup being disposed between said opening and said discharge tube whereby the suction created by the flow of steam causes a current of air to flow into the cover, across the top of the medicine cup and into the vapor discharge tube.

WILFRED G. JOHNSON.
HALL KIRKHAM.