United States Patent

Hirtz et al.

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[45] **Oct. 3, 1972**

[54] **INHALATOR FOR MOIST AIR**

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[51] **Int. Cl.**.....**A61m 15/00**
[58] **Field of Search**.....128/192, 193, 195, 201, 205, 128/212, 209, 185, 186, 208, 173.2; 219/272-276; 261/99, 104, 107, 142, DIG. 65

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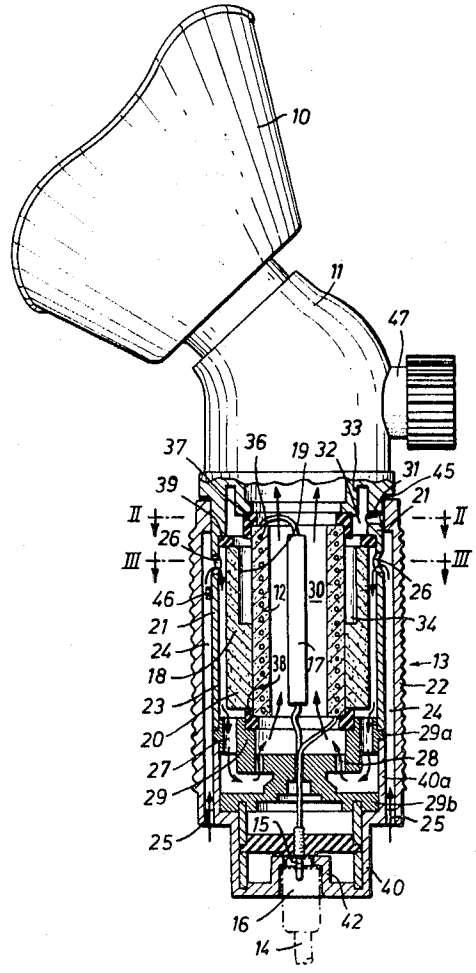
[57] **ABSTRACT**

An inhalator has a tubular heating element through which inhaled air passes after flowing in countercurrent through an annular air passage between a tubular housing wall and a tubular porous body surrounding and abutting the tubular heating element. The porous body has capillary passages for absorbing a liquid whose vapor is added to the inhaled air in the annular passage

19 Claims, 12 Drawing Figures



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SHEET 1 OF 5

FIG. 1

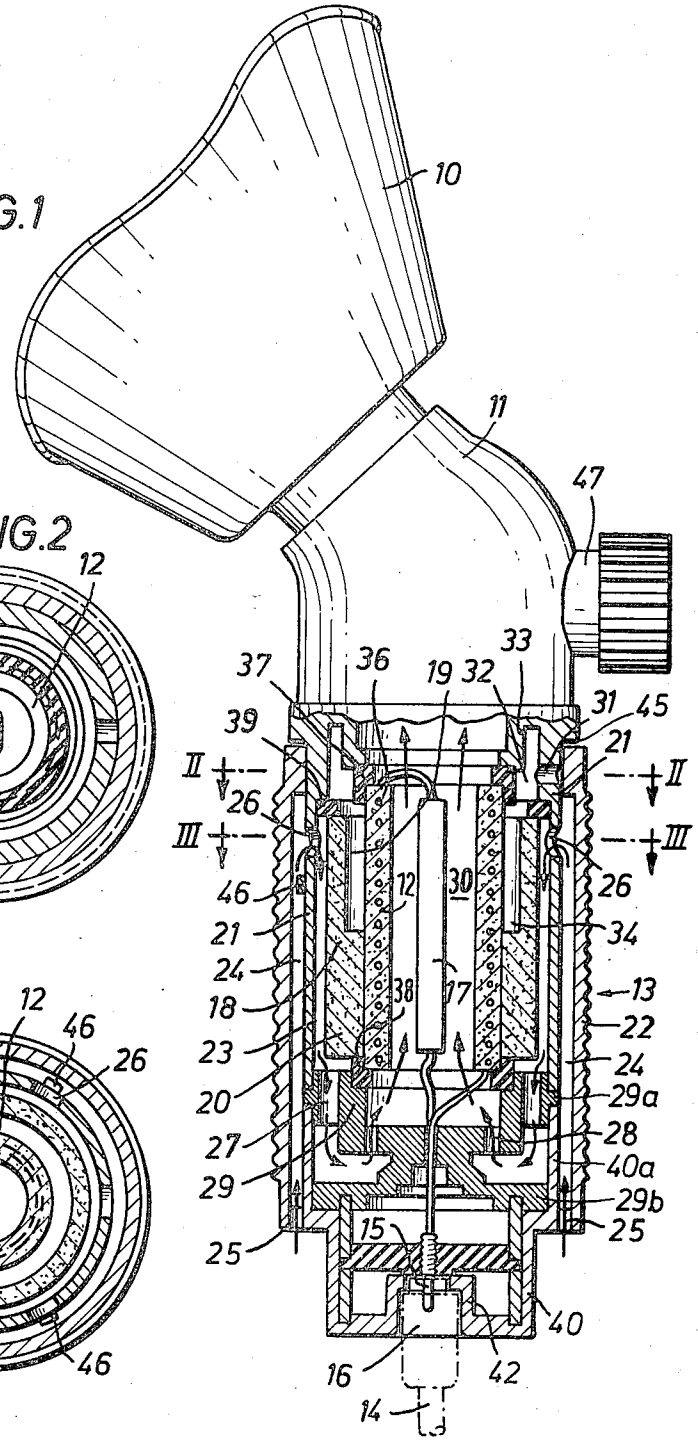


FIG. 2

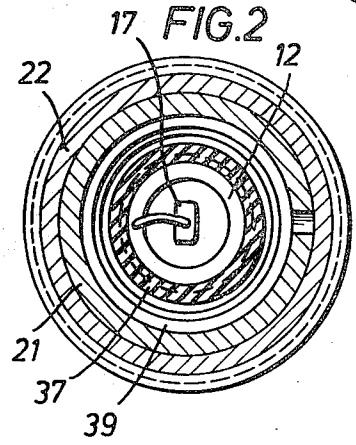
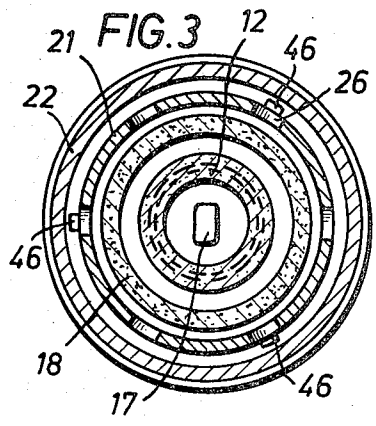


FIG. 3



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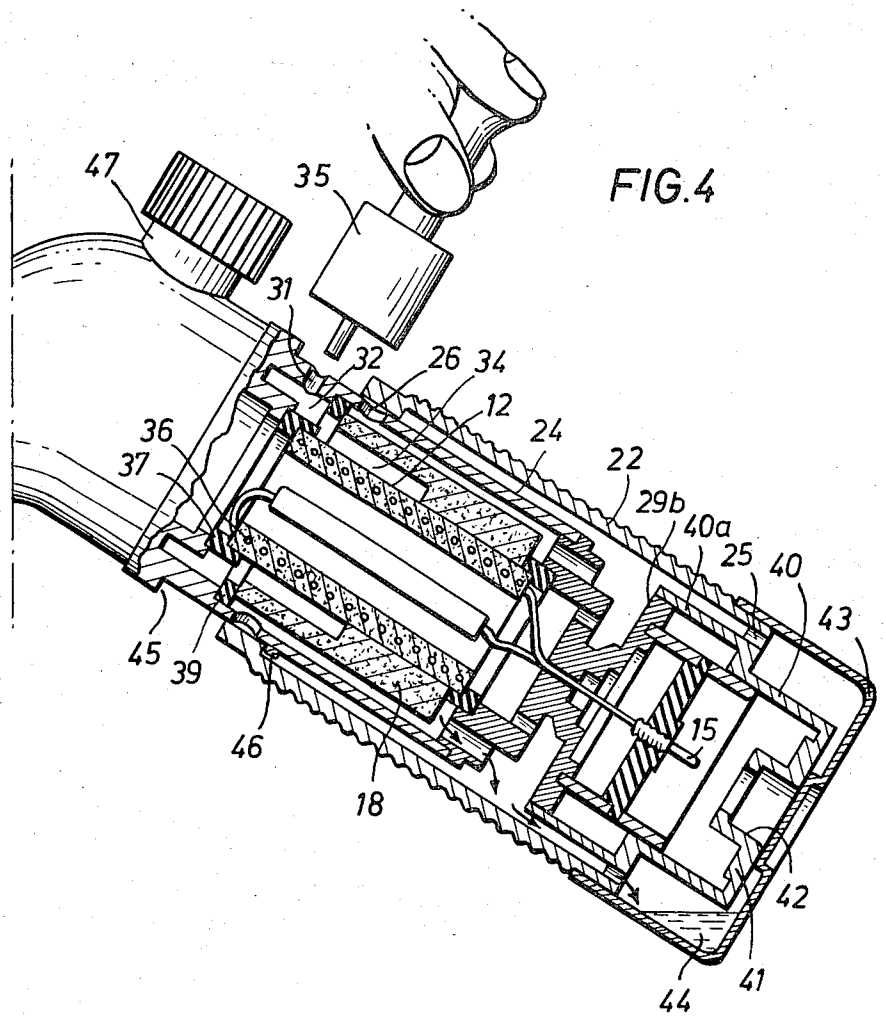

FIG.4

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FIG.5

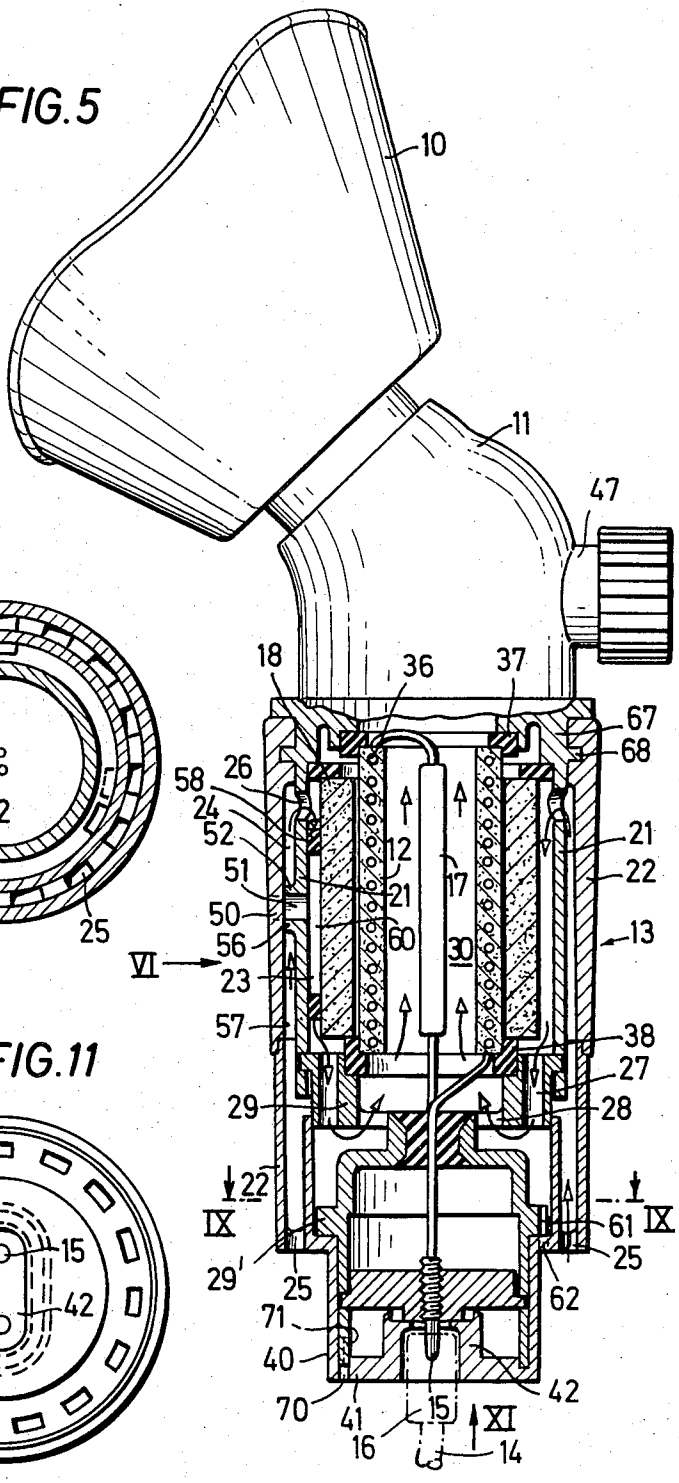


FIG.9

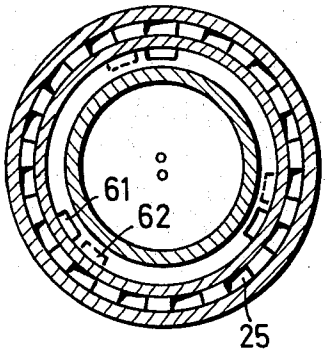
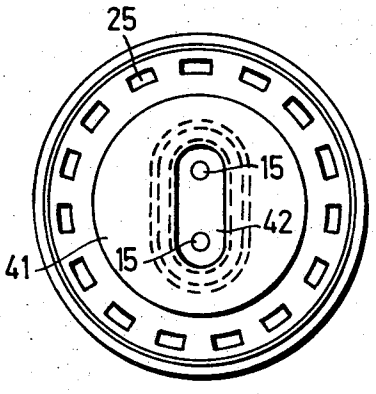


FIG.11



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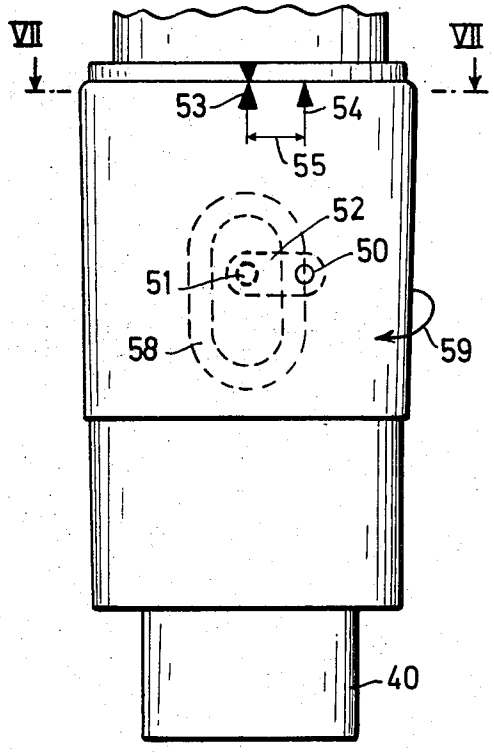

FIG.6

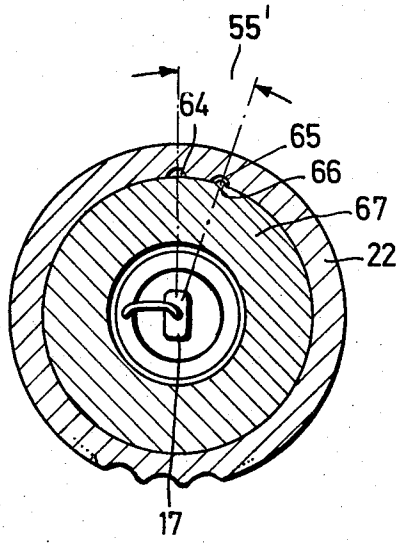

FIG.7

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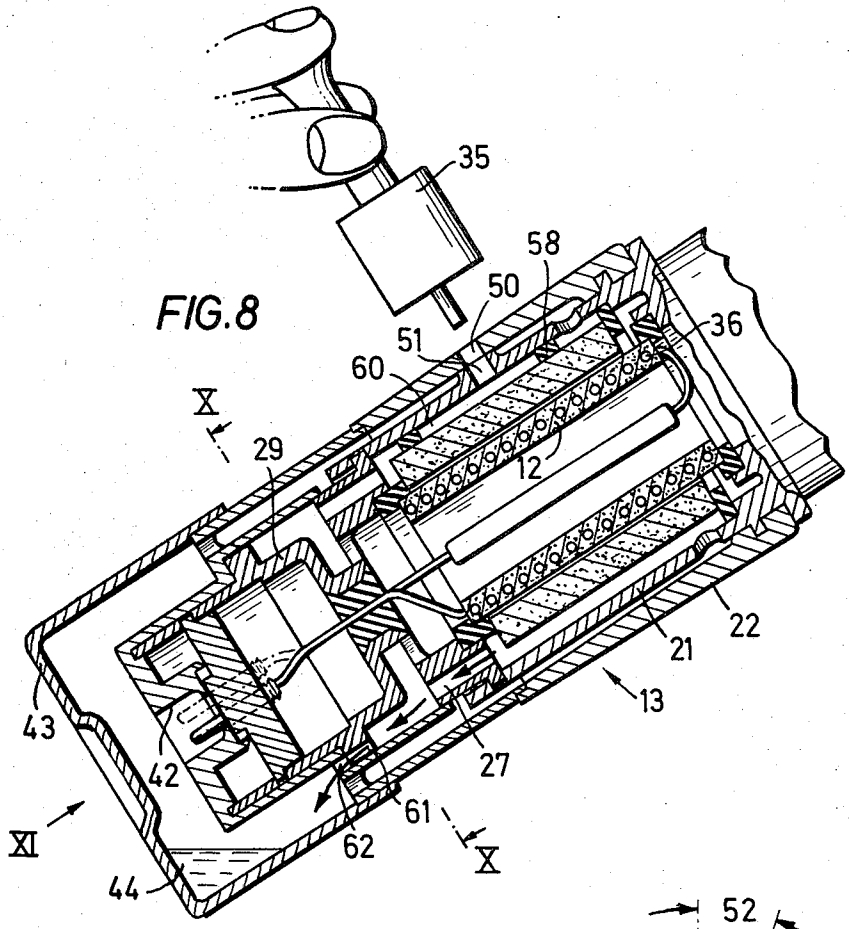
FIG.8



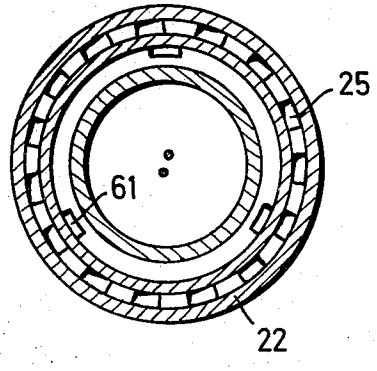


FIG.10

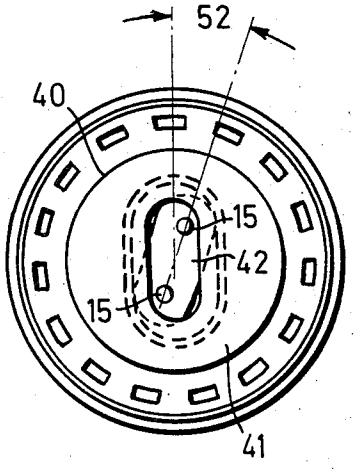


FIG.12

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INHALATOR FOR MOIST AIR

BACKGROUND OF THE INVENTION

The present invention relates to inhalators of the type having a face mask which communicates through a connector with a space provided with a heating element, and with liquid by which the inhaled air is moistened.

The inhalators of the prior art have the disadvantage that liquid in a container can be easily spilled, and that it is not possible to obtain a very high percentage of moisture in the inhaled air.

SUMMARY OF THE INVENTION

It is one object of the invention to overcome the disadvantages of known inhalators, and to provide an inhalator suitable for respiratory diseases which require inhaling of air having a comparatively high percentage of moisture.

Another object of the invention is to provide an inhalator into which a liquid can be filled in a very simple manner, without requiring the removal of the means in which the liquid is stored.

Another object of the invention is to obtain a substantially constant percentage of moisture in the inhaled air over a long time of use of the apparatus.

Another object of the invention is to provide means for storing a liquid without permitting a spilling or flowing out of the liquid.

Another object of the invention is to guide the inhaled air along a liquid storing means before the air comes into contact with the heating means.

Another object of the invention is to provide between the liquid storing means and an outer wall of the housing, an air passage so that the air in the same cools the housing wall to a temperature at which it can be manually gripped.

With these objects in view, the present invention provides a liquid storing means which includes a hard porous body having capillary passages in which the liquid is held. The porous body may consist of a sintered or frit material, or of pumice, dripstone, or porous ceramics. Any porour body capable of holding a liquid, particularly water, by capillary action, may be used.

A capillary body for storing the liquid has the advantage that a sufficient amount of liquid can be held without the danger of spilling, while the liquid is sufficiently vaporized by air passing the porous body. The holding of the stored amount of liquid by the capillary passages of the porous body is particularly important, because inhalators are preferably provided with electric heating elements which must not come into contact with liquid, such as water.

Another advantage of a capillary liquid storing means is that a hard porous body having the properties of the materials named above, again yields the liquid, particularly water, completely without the formation of deposits which would cause, after a long period of use, fouling of the liquid storage means. As a result, the porous capillary body according to the invention can be used for a long time without being subjected to any changes in its physical or chemical characteristics.

Generally speaking, an embodiment of the invention comprises housing means having inlet means and outlet means, the latter preferably including a face mask, so

that air inhaled by the patient flows from the inlet means to the outlet means along a path in which heating means and a porous body are located adjacent each other.

The porous body has capillary passages containing a liquid, and since the inhaled air passes the porous body which is being heated by the heating means, the liquid is vaporized and added to the flow of inhaled air.

In the preferred embodiment of the invention, the porous capillary body is tubular and surrounds a tubular heating means which preferably has a ceramic tube, and electric heating wires supported by the same.

Preferably, the housing means includes at least one tubular housing wall surrounding the porous body and forming an annular air passage with the same communicating with the inlet means. The air passage is also connected by the inner space of the tubular heating means with the outlet means leading to the face mask, so that not only vaporized liquid is added to the inhaled air in the annular passage before the air is heated, but also the air in the annular passage cools the housing wall whereby the same can be manually gripped during the use of the inhalator.

In the preferred embodiment of the invention two cylindrical tubular housing walls surround the tubular porous body, and air flows in countercurrent through the two annular passages formed in this manner. The two annular air passages, and the inner space within the tubular heating element, are connected by openings near the ends of the two tubular cylindrical housing walls.

A filling space is provided adjacent the porous body which may have a corresponding recess on the side facing the heating means, or a filling space may be formed in one of the air passages by a sealing ring. The filling chambers have filling openings which are normally closed by the outer cylindrical housing wall. However, by either angularly turning, or axially shifting the outer housing wall, the filling opening can be exposed, and fresh liquid can be filled into the filling chamber of the porous liquid storing body, from where the liquid is soon absorbed. Irrespective of the volume and position of the filling chamber, the entire filled in liquid is quickly distributed through the capillary passages of the porous body so that the entire outer surface along which air flows, can supply vapor into the air.

A socket and plug connection is provided for connection electric heating means with a source of voltage. In the preferred embodiment, the turning or shifting of the outer tubular cylindrical housing wall to a position exposing the filling opening, prevents the insertion of the plug into the socket so that the electric heating means is disconnected when the liquid is being filled into the filling chamber and might be spilled before being absorbed by the porous body.

Since the porous body surrounds and abuts the ceramic tube of the heating element, it is advantageous to use a ceramic tube whose outer surface is glazed, or whose material absorbs absolutely no liquid.

While the inhalator will be mainly used with water as a moistening agent, any other liquid which may be considered appropriate for therapeutic reasons, can be used.

In addition to the porous liquid storing body, a medication carrier can be provided which causes mixing of a

volatile medication with the inhaled moistened air. If for any reason, a gas other than air is to be moistened and inhaled, the inlet of the housing can be connected to a container for the desired gas.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiment when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation, partially in vertical section, illustrating one embodiment of the invention;

FIG. 2 is a cross-sectional view taken on line II—II in FIG. 1;

FIG. 3 is a cross-sectional view taken on line III—III in FIG. 1;

FIG. 4 is a fragmentary side elevation, partially in section, and illustrating the embodiment of FIG. 1 in a filling position;

FIG. 5 is a side elevation, partially in section, illustrating a second embodiment of the invention;

FIG. 6 is a fragmentary front elevation taken in the direction of the arrow VI in FIG. 5;

FIG. 7 is a cross-sectional view taken on line VII—VII in FIG. 6;

FIG. 8 is a fragmentary side elevation, partially in section, and illustrating the embodiment of FIG. 5 in the filling position;

FIG. 9 is a cross-sectional view taken on line IX—IX in FIG. 5;

FIG. 10 is a cross-sectional view taken on line X—X in FIG. 8;

FIG. 11 is an end view taken in the direction of the arrow XI in FIG. 5; and

FIG. 12 is an end view taken in the direction of the arrow XI in FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In both embodiments of the invention, a face mask 10, a connector 11 with an air passage, and housing means 13 forming a handle, are provided. A tubular heating means 12 has a ceramic tube in which electric heating wires are embedded which are connected by a plug 15 with a socket 16 and a cord 14 which is connectable to a source of voltage. In the inner space formed by the tubular ceramic carrier of heating element 12, a thermostat element 17 is provided. The tubular heating means 12 has a cylindrical outer surface against which the cylindrical surface of a hard porous body 18 abuts. The porous body 18 has capillary passages and surrounds the heating means 12. The hard porous body may be made of pumice, dripstone, suitable ceramics having capillary passages, or of sintered or frit material, and is thus suitable to store a liquid in its capillary passages.

The tubular body 18 is surrounded by an inner tubular and cylindrical housing wall 21 and forms with the same an annular air passage 23. The inner tubular housing wall 21 is surrounded by an outer tubular housing wall 22 and forms with the same another annular air passage 24. Air passage 24 has inlet openings 25 which constitute inlet means for air flowing into the housing means 13, as indicated by arrows. The air flows from inlet openings 25 into and in axial direction along the annular air passage 24, and from there through connecting openings 26 in the inner tubular housing wall 21 into the inner annular air passage 23 in which the air flows in countercurrent to the air in air passage 24 in downward direction whereupon the air passes through openings 27 and 28 in an end member 29 which is secured to the inner housing wall 21. The air flowing through openings 27 and 28 flows again in countercurrent through the inner space formed by the tubular heating means 12, and then enters a passage, not shown, in connector 11 to be inhaled through the face mask 10. The counter currents of the inhaled air are indicated by arrows. The tubular heating means 12 heats the surrounding and abutting tubular porous capillary body 18 so that the liquid stored in the capillary passages of the same is vaporized by the air stream flowing in axial direction through the annular air passage 23. Consequently, the air flowing into the inner space of heating means 12 is moistened, and heated by the heating means 12 to a desired temperature suitable for the patient. A medication carrier 47 of known construction may store a volatile medication whose vapor is added to the flowing air.

The temperature of the air is determined by the thermostat 17 which, in the usual manner, disconnects the voltage from heating element 12 when the heat of the air exceeds a desired maximum.

The flow of air through passages 23 and 24 not only assures a quick and uniform heating of the air, but also effects cooling of the outer housing wall 22 which forms a handle which can be gripped by the patient using the inhalator. The heating means 12 is separated from the outer wall 22 by the liquid storing body 18, and by the two annular air passages 23 and 24 in which cooling air, entering through inlet openings 25, passes in countercurrent before being heated. The heat conducted from body 18 into the airstream in annular passage 23, does not affect the outer wall 22, since the air heated in passage 23 flows into the inner space of the tubular heating means 12. Due to the fact that the entering air is moistened in passage 23, thermostat element 17 controls the temperature of the already somewhat heated and moistened air, so that it is possible to control the temperature and percentage of moisture within the air within narrow limits so that the temperature and moisture of the air can be adapted without difficulties to optimal values required by the condition of the patient.

The above description was applicable to both embodiments of the invention illustrated in FIGS. 1 and 5, respectively.

The two embodiments differ from each other by the manner in which a liquid, such as water, is filled into the inhalator for being absorbed by the porous body 18.

Referring first to the embodiment of FIGS. 1 to 4, the outer tubular cylindrical wall 22 has an end portion 40 closing the lower end of the same, and including an annular part 40*a* engaging a corresponding flange 29*a* of end member 29 in the position of FIG. 1, while engaging an annular flange 29*b* in the position of FIG. 4. The inner cylindrical housing wall 21 has a filling opening

31 which is closed by the end portion of the outer housing wall 22 in the normal position of FIG. 1, and is uncovered in the filling position of the outer housing wall 22 shown in FIG. 4. Stops 45 and 46 limit the movement of the outer cylindrical housing wall 22 in axially displaced end positions. Filling opening 31 opens into an annular space 32 which is bounded by the upper part of the inner cylindrical wall 21, by an annular end member 33, and by sealing rings 37 and 39. The annular space 32 communicates with a recess 19 formed in the inner surface of the porous body 18 which forms an annular filling chamber 34 with the heating means 12.

As shown in FIG. 4, a measured amount of liquid can be filled into the filling chamber 34 through the filling opening 31 and annular space 32 when a pipette 35 is inserted into the filling opening 31. Liquid in the filling chamber 34 is immediately absorbed by the capillary passages of the porous body 18. If for any reasons too much liquid has been filled into filling chamber 34 and annular space 32, the liquid can flow into the air passage 24 and out of inlet openings 25 into a cap 44 which may be placed on the lower end of the outer cylindrical wall 22 during the filling operation. The overflowing liquid discharged through openings 25, and if desired collected in cap 44, cannot get into contact with the electric parts of the apparatus which are completely sealed off by sealing means 37, 39 and 38. The ceramic tube of heating means 12 is prevented from receiving any moisture from the adjacent porous body 18 which abuts with axially extending inner ribs on the outer surface of the heating means 12 in the embodiment of FIGS. 1 to 4, and which abuts with its entire cylindrical inner surface on the outer cylindrical surface of the heating means 12 in the embodiment of FIGS. 5 to 12. The ceramic tube in which the electric heating wires 36 are embedded, can be made of a ceramic which has no capillary passages and will not receive any moisture, or the ceramic tube can be glazed on the outside so that no moisture can enter the ceramic material.

The end member 40 of the cylindrical outer tubular wall 22 has a smaller diameter than the same, and has a cup-shaped depressed center portion in which the socket 16 is located in a position engaged by the plugs 15 when the inhalator is in the normal operational condition shown in FIG. 1. When the outer wall 22 is shifted from the position of FIG. 1 to the filling position shown in FIG. 4, the socket moves with the cup-shaped portion 42 away from plugs 15 so that the flow of current to the heating wires 26 of the heating means 12 is interrupted. Consequently, during the filling operation, which requires a shifting of the outer wall 22 to the position shown in FIG. 4 uncovering filling opening 31, the heating wires 36 are not energized. When the filling operation has been completed, and the outer housing wall 22 is shifted back to the position of FIG. 1, the socket 16 can be again inserted into the recess formed by the cup-shaped portion 42 so that the plugs 15 enter the corresponding opening in socket 16, and the heating wires 36 are again energized.

In the embodiment of FIGS. 5 to 12, the outer tubular housing wall 22 has a filling opening 50, best seen in FIG. 8, which cooperates with the filling opening 51 in the inner housing wall 21. The outer housing wall 22 with its end member 40, and the cup-shaped center portion 42 are turnable through a limited angle relative to the inner housing wall 21.

The inner tubular housing wall 21 has the filing opening 51 in a thicker boss portion 52 which outwardly projects into sliding engagement with the inner surface of the outer tubular housing wall 21. The boss 52 extends in circumferential direction a slightly greater arc than the arc which corresponds to the angle which the outer housing wall 22 is turnable relative to the inner housing wall 21. This arc 55 is indicated by the indicia 53 and 54 in FIG. 6. The annular air passage 24 between housing walls 21 and 22 is separated from the filling openings 50 and 51 by the boss 52 which slides on the inner surface of the outer housing wall 22. During turning of the outer housing wall 22, the inner surface of the same slides on the annular end face of the boss 52 between a position indicated by indicia 53 in which filling opening 50 is spaced from filling opening 51, and the position indicated by indicia 54 in which filling openings 50 and 51 register, as shown in FIG. 8.

Within the inner annular air passage 23 between the inner housing wall 21 and the tubular porous body 18, a sealing ring 58 is disposed around the inner filling opening 51 so that the space 60 within sealing ring 58 is sealed from the remainder of the annular air passage 23. Space 60 forms a filling chamber communicating with the inner filling opening 51, and being closed by the outer cylindrical wall 22 in the position of FIG. 1, while in the position of FIG. 8, a measured amount of liquid can be filled into the filling chamber 60 by a pipette 35.

The normal position of the outer housing wall 22 is illustrated in FIGS. 5, 6, 7, 9 and 11 in which the filling openings 50 and 51 are circumferentially staggered and disconnected from each other. The inner filling opening 51 and the filling chamber 60 within sealing ring 58 are closed since the inner surface 36 of the outer housing wall 22 slidingly abuts the outer annular end face 56 of the boss 52. The inner filling opening is not accessible from the outside.

If the amount of liquid stored in the capillary passages of the porous body 18 is exhausted, and filling in of fresh liquid is required, the outer tubular housing wall 22 is turned the arc 55 in the direction of the arrow 59 shown in FIG. 6 until the outer filling opening 50 registers with the inner filling opening 51, as shown in FIG. 8. The pipette 35, or any other means, can now be used for filling liquid into the filling space 60 where the liquid is in contact with the outer surface of the porous body 18. The volume of filling chamber 60, and the surface of porous body 18 bounding filling chamber 60 within sealing ring 58, are so dimensioned that within a very short period of time, a sufficient amount of liquid can be filled into the filling chamber and is fully absorbed by the capillary passages of porous body 18. By filling in the correct measured amount, which may be indicated on the pipette 35, no excess liquid can flow into other parts of the housing. However, if for any reason too much liquid has been filled in and enters in some way the inner annular air passage 23, the excess liquid flows through openings 27, and openings 61 and 62 into a cap 43 which can be placed on the lower end of the outer housing wall 22 during the filling operation, and accumulates there at 44, as shown in FIG. 8. Contact of the liquid with the electrical heating means

is entirely avoided in this manner. As shown in FIG. 9, openings 61 and 62 are staggered and closed in the normal position of the inhalator shown in FIG. 5, and register in the filling position of the inhalator, as shown in FIG. 10 due to the angular displacement of the outer housing wall 22 relative to the inner housing wall 21 and its end portion 29*a*.

FIG. 12 illustrates the end member 40 of the outer tubular housing wall 22 in the position of FIG. 8 in which the outer tubular housing wall 22 is angularly displaced an angle 52 corresponding to the arc 55 in FIG. 6. Since the cup-shaped center portion 42 is displaced relative to the plugs 15, the openings in socket 16 cannot be engaged by plugs 15 when the socket 16 is inserted into the recess in the cup-shaped center portion 42. On the other hand, the outer tubular housing wall 22 cannot be turned out of the position shown in FIG. 5 to the position shown in FIG. 8 when socket 16 remains on plug 15. Since socket 16 has to be removed before the outer tubular housing wall 22 is turned to the filling position of FIG. 8, it is not possible to carry out a filling operation while the electric heating wires 36 are energized.

The upper annular end portion 67 of the inner housing wall 21 has an annular flange 68 projecting into a corresponding annular recess in the upper end portion of the outer tubular housing wall 22 so that the same is supported for angular movement, as explained above. As shown in FIG. 7, the upper end of the outer tubular housing wall 22 has two arresting recesses 64 and 65 which are respectively engaged by a projection 66 in the upper annular portion 67 in the two angularly displaced positions of the outer tubular housing wall 22. The catch projection 66, see FIG. 7, arrests the outer tubular housing wall 22 in either end position of the same so that the distance between the recesses 64 and 65 determines the turning angle 55' and the length of arc 55. The housing walls 21 and 22, and the other housing parts are advantageously made of synthetic material which has a certain resilience so that the catch projection 66 need not be resiliently supported, and nevertheless an arresting of the parts in the end positions of the outer housing wall 22 is obtained.

After the filling has been completed and the liquid in the filling chamber 60 absorbed by the porous body 18, the outer cylindrical housing wall 22 with the end member 41 is returned to the initial position as shown in FIG. 5 in which the filling opening 51 is closed. The elongated recess of the cup-shaped central portion 42 of end member 41 is then in a position permitting the insertion of socket 16 onto the plug 15.

Although there is little danger of entering any liquid into the region of the electric heating means 12, as explained above, the bottom of end member 41 of the outer tubular housing wall 22 is provided with an opening 70 which is associated with a recess 71 in the lower portion of the end member 29' of the inner tubular housing wall 21, as shown in FIG. 5. The arrangement is such that opening 70 and recess 71 register when the filling openings 50 and 51 register in the filling position shown in FIG. 8. Outlet opening 70 and recess 71 constitute a final safety measure for the unlikely event that due to unforeseen circumstances, liquid has accumulated in the space between end member 41 and end member 29', the passage 70, 71 permitting discharge of this liquid.

The medication carrier 47 in the passage formed by the connector 11 permits the addition of a volatile medication to the moistened air inhaled by the patient. Due to the use of a face mask, the heated, moistened, and medicated air directly enters the respiratory passages of the patient, without any waste or loss of the medicated air.

Evidently, the inhalator can also be used for inhaling dry hot air, if required by the particular condition of the patient. It is only necessary to omit filling of the porous liquid storing body 18.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of inhalators differing from the types described above.

While the invention has been illustrated and described as embodied in an inhalator having a porous capillary body for storing a liquid whose vapor is added to air before the same is heated and inhaled, it is not intended to be limited to the details shown, since various modifications and structural changes map be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can be applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. An inhalator for moist air, comprising, in combination, housing means having inlet means for air, and outlet mean adapted for inhalation, said housing means including at least one tubular wall; tubular heating means mounted in said housing means and having an inner space communicating with said outlet means; and a porous tubular body surrounding and at least partly abutting said heating means so as to be heated by the same; said tubular body having capillary passages containing a vaporizable liquid; said tubular housing wall surrounding said porous tubular body and forming an annular air passage with the same communicating with said inlet means, and being connected by said inner space of said heating means with said outlet means whereby vaporized liquid is added to the inhaled air flowing through said annular passage before the air is heated in said inner space of said heating means so that the air in said annular passage cools said housing wall whereby the same can be manually gripped.

2. An inhalator for moist air, comprising, in combination, housing means having inlet meant for air, and outlet means adapted for inhalation; hollow tubular heating means mounted in said housing means and having an inner space communicating with said outlet means; and a porous tubular body mounted in said housing means surrounding said heating means, said porous tubular body having capillary passages containing a vaporizable liquid so that said heating means heats said tubular body and said vaporizable liquid; said housing means including a first cylindrical wall surrounding said porous tubular body and forming a first

annular air passage with the same, and a second cylindrical wall surrounding said first cylindrical wall and forming a second annular air passage with the same, said second air passage being connected at one end with said inlet means and at the other end with the adjacent one end of said first air passage whose other end communicates through said inner space with said outlet means so that the inhaled air flows in countercurrent through said second and first annular air passages whereby said second wall is cooled and adapted to be manually gripped while the air flowing through said first annular air passage receives vapor from said porous tubular body before passing through said inner space of said heating means where the moistened air is heated before being inhaled through said outlet means.

3. An inhalator as claimed in claim 2, wherein said housing means form a filling chamber at least partly bounded by said pourous tubular body; and wherein said first cylindrical wall has a filling opening communicating with said filling chamber whereby a liquid can be filled into said filling chamber through said filling opening for absorption into the capillary passages of the porous tubular body.

4. An inhalator as claimed in claim 3 wherein said second annular wall is mounted for movement in axial direction between a normal position closing said filling opening, and a filling position uncovering said filling opening.

5. An inhalator as claimed in claim 2, comprising an annular sealing ring located in said first annular passage and surrounding a sealed off filling chamber; and wherein said first cylindrical wall has a first filling opening communicating with said filling chamber.

6. An inhalator as claimed in claim 5 wherein said second cylindrical wall has a second filling opening; and wherein said second cylindrical wall can be turned relative to said first cylindrical wall between a normal position in which said first filling opening is covered and closed by said second cylindrical wall, and a filling position in which said first and second filling openings register and a liquid can be filled through the same into said filling chamber for absorption by said porous body.

7. An inhalator as claimed in claim 6 wherein said first and second walls have portions surrounding said first and second filling openings and abutting each other so that the liquid flowing into and through said openings is separated from said second annular air passage.

8. An inhalator as claimed in claim 7 wherein said portion of one of said walls is a boss having the respective filling opening; and wherein the circumferential extension of said boss is at least equal to the arc along which said second filling opening moves during turning of said second cylindrical wall relative to said first cylindrical wall between two end positions; and wherein said housing means include means for limiting turning movement of said second cylindrical wall in said two end positions.

9. An inhalator as claimed in claim 3, wherein said tubular porous body has an inner surface formed with an annular recess adjacent and surrounding the outer surface of said heating means and forming with the same at least part of said filling chamber.

10. An inhalator for moist air, comprising, in combination, housing means having inlet means for air, and outlet means adapted for inhalation; heating means mounted in said housing means; and a porous tubular body having capillary passages containing a vaporizable liquid, said tubular body being mounted in said housing means adjacent said heating means so that said heating means heat said tubular body and said vaporizable liquid, said housing means, tubular body, and heating means forming a path for inhaled air flowing from said inlet means to said outlet means; said tubular body and said heating means being located in said path so that air from said inlet means flowing along said path is moistened by vaporized liquid from said tubular body and heated by said heating means before being inhaled through said outlet means; said housing means forming a filling chamber at least partly bounded by said porous tubular body, and including an inner wall having a filling opening communicating with said filling chamber and an outer wall movable relative to said inner wall between a normal position closing said filling opening and a filling position uncovering said filling opening; and comprising a socket end plug connection for said heating means, said outer cylindrical wall having a portion blocking engagement of said socket plug means in said filling position.

11. An inhalator for heated moist air, comprising, in combination, housing means having inlet means for air, and outlet means adapted for inhalation; a porous tubular body mounted in said housing means, and having capillary passages for storing a vaporizable liquid; heating means mounted in said housing means and located within said porous tubular body for heating said porous tubular body whereby said liquid is evaporated; said housing means, porous tubular body, and heating means forming an air passage between said inlet means and outlet means, said air passage including an outer passage portion formed between said housing means and said porous tubular body and communicating with said inlet means, and an inner passage portion within said porous tubular body communicating with said outlet means, said heating means being located in said inner passage portion so that air flowing from said inlet means through said passage and out of said outlet means cools said housing means while being moistened in said outer passage portion by liquid evaporating from said heated porous tubular body, and is then heated in moist condition by said heating means before being inhaled through said outlet means.

12. An inhalator as claimed in claim 11 wherein said tubular body consists of sintered or frit material.

13. An inhalator as claimed in claim 11 wherein said body consists of a porous material taken from the group consisting of pumice, dripstone and ceramics.

14. An inhalator as claimed in claim 11 wherein said heating means has a cylindrical outer surface; and wherein said porous tubular body has a cylindrical inner surface surrounding aid outer surface; and comprising sealing rings between said housing means and said heating means, and between said housing means and said tubular body.

15. An inhalator as claimed in claim 11 wherein said heating means includes a ceramic tubular member bounding said inner passage portion; and electric heating wires supported within the same; wherein said porous tubular body surrounds the outer surface of said ceramic tubular member; and wherein said ceramic tu-

bular member is impermeable to the liquid stored in said porous body.

16. An inhalator as claimed in claim 11, wherein said heating means is tubular and located around said inner passage portion so that the inhaled air flows through said tubular heating means; and comprising thermostat means controlling said heating means and including a thermostat element located in said tubular heating means in the flow of inhaled air.

17. An inhalator as claimed in claim 11, comprising a face mask; and wherein said housing means includes a housing having said outlet means, and a connector tube connecting said outlet means with said face mask; and comprising a medication carrier mounted on said housing means and located in said passage so that a medication is added to the air flowing to said mask through said passage and outlet means and containing vaporized liquid.

18. An inhalator as claimed in claim 11 wherein said heating means is tubular and has annular outer and inner surfaces; wherein said porous tubular body has an inner surface surrounding said outer annular surface of said heating means; and wherein said inner passage portion is bounded by said inner annular surface of said tubular heating means; and thermostat means located in said tubular heating means and controlling said heating means.

19. An inhalator for moist air, comprising, in combination, housing means having inlet means for air, and outlet means adapted for inhalation, said housing means including at least one tubular wall; tubular heating means mounted in said housing means and having an inner space communicating with said outlet means; and a porous tubular body surrounding said heating means so as to be heated by the same; said tubular body having capillary passages containing a vaporizable liquid; said tubular housing wall surrounding said porous tubular body and forming an annular air passage with the same communicating with said inlet means, and being connected by said inner space of said heating means with said outlet means whereby vaporized liquid is added to the inhaled air flowing through said annular passage before the air is heated in said inner space of said heating means so that the air in said annular passage cools said housing wall whereby the same can be manually gripped.

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