

E. K. HILL.
 INHALER AND RESPIRATOR.
 APPLICATION FILED SEPT. 13, 1911.

1,049,088.

Patented Dec. 31, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

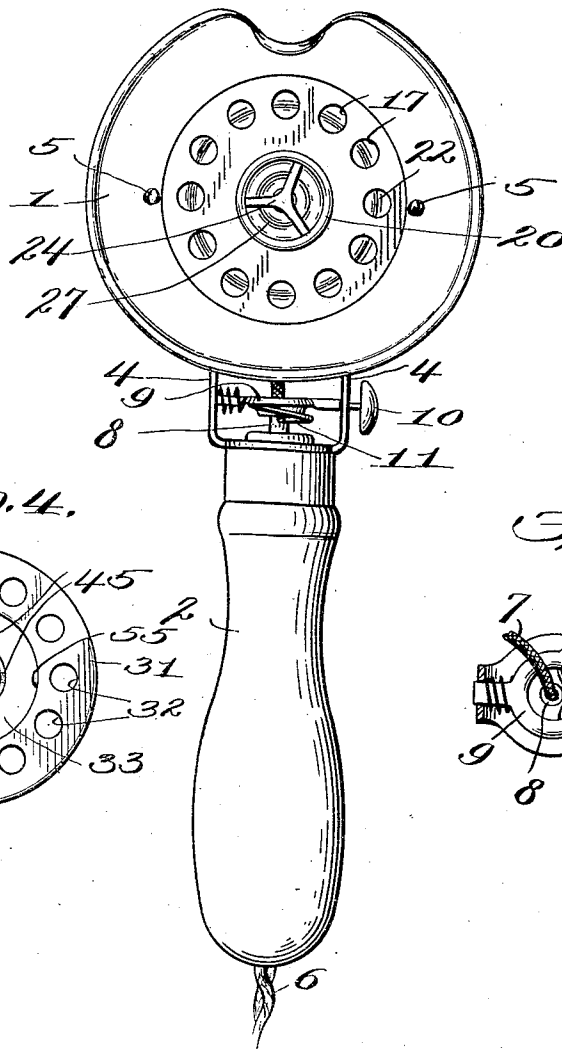


Fig. 4.

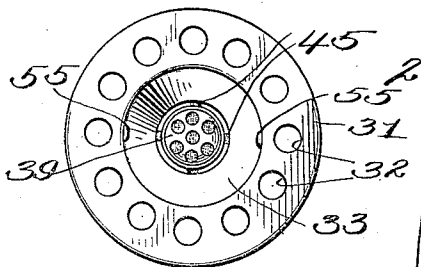
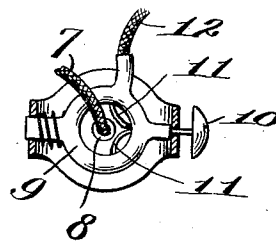


Fig. 5.



Witnesses:

Clarence A. Bateman

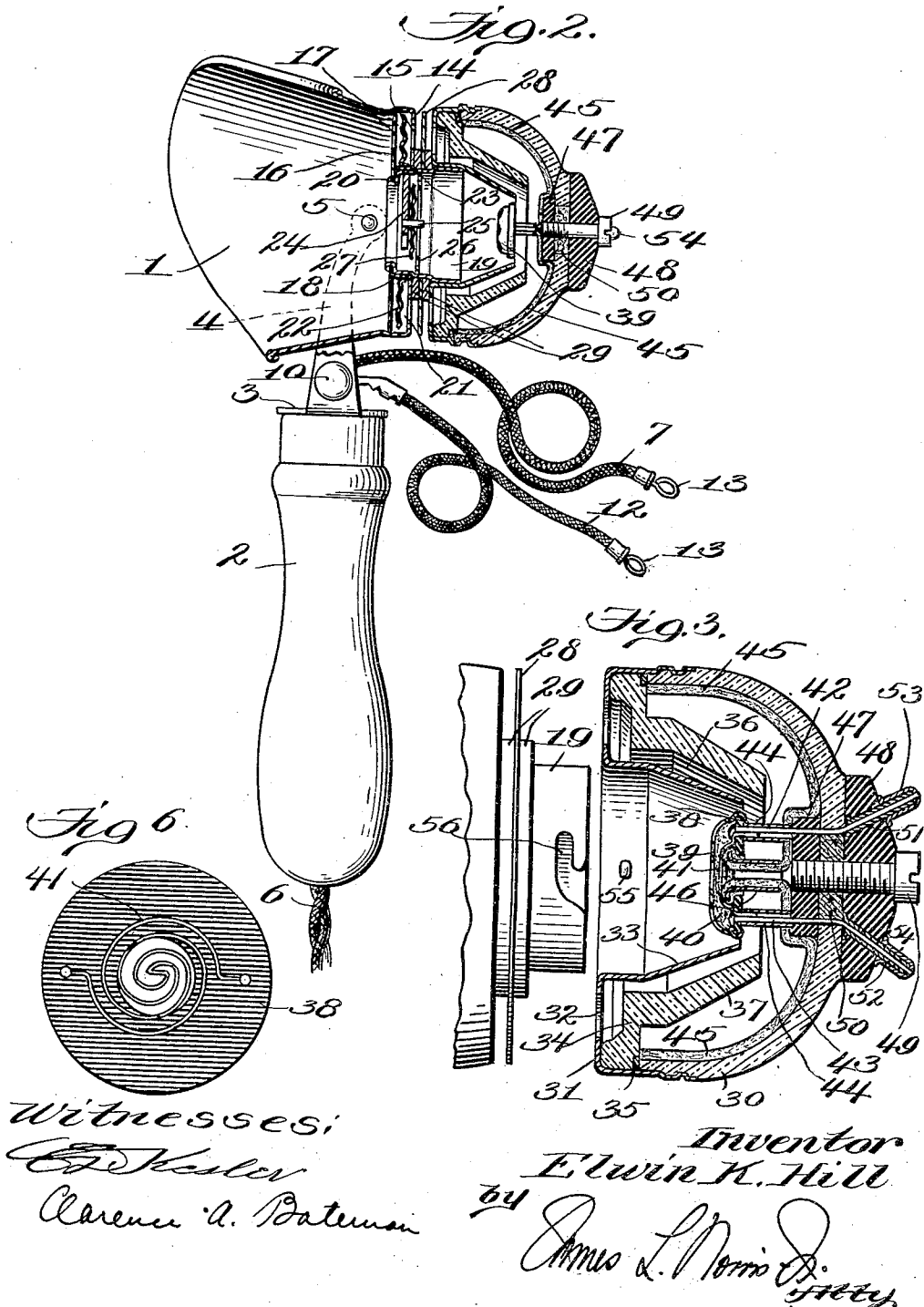
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 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ELWIN K. HILL, OF CLEVELAND, OHIO, ASSIGNOR TO THE ELECTRIC RESPIRONE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

INHALER AND RESPIRATOR.

1,049,088.

Specification of Letters Patent.

Patented Dec. 31, 1912.

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To all whom it may concern:

Be it known that I, ELWIN K. HILL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Inhalers and Respirators, of which the following is a specification.

My present invention relates to improvements in inhalers, respirators and analogous instruments adapted for use in the treatment of diseases of the respiratory organs with medicated vapors, for protecting such organs from the injurious effects of a foul or impure atmosphere, and for similar purposes, and it has for its object primarily to provide a generally improved instrument of this kind which is capable of being used conveniently and effectively and particularly to provide the vaporizing means for the medicament with a self-feeder whereby a proper supply of the medicament for the vaporizing means is maintained at all times without requiring the special care and attention of the user.

Another object of the present invention is to provide a reservoir for holding a supply of the medicament, the reservoir being so constructed that it will not spill or permit leakage of the medicament when the instrument is placed in different positions, and, moreover, the reservoir is provided with means for detachably coupling it to the body of the instrument whereby a number of reservoirs containing different kinds of medicaments may be interchangeably used with the instrument for the treatment of different diseases or for different purposes.

A further object of the present invention is to provide as a unit a reservoir for the medicament, combined with a vaporizer having means for feeding the medicament thereto automatically from the reservoir, units of this character being adapted to be used interchangeably in connection with the instrument as above indicated.

The present invention also involves certain structural improvements over my prior Patent, No. 823,946 granted June 19, 1906.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—Figure 1 is a front elevation of an instrument constructed in accordance with the preferred embodiment of my invention; Fig. 2 represents a central vertical section through the part of the instrument as shown in Fig. 1; Fig. 3 is a detail sectional view on an enlarged scale of the vaporizing and reservoir member and also showing a portion of the instrument to which this member is adapted to be removably attached; Fig. 4 is a face view of the detachable and interchangeable vaporizing and reservoir member; Fig. 5 is a detail view of the electric switch used for controlling the current which heats the vaporizing means; and Fig. 6 is a detail enlarged view of the electric heating element for the vaporizing means.

Similar parts are designated by the same reference characters in the several views.

In the accompanying drawing, the instrument comprises a hood 1 which is properly shaped to fit the face of a person so as to inclose the mouth and also the nose, and a handle 2 is provided whereby the user may hold the instrument in proper position. To facilitate manipulation of the instrument, the hood is preferably connected pivotally to the handle whereby the angular relation between the hood and the handle may be varied. For this purpose, the handle is provided at its upper end with a yoke 3 having a pair of arms 4 which are connected to opposite sides of the hood by the pivots 5. The handle in the present instance is provided with means for controlling an electric current which serves to heat the vaporizer for the medicament. In the construction shown, the electric conducting wires 6 extend upwardly through the handle which is formed with a bore for this purpose and one of these wires 7 extends without interruption through a tube 8. The tube 8 serves as one of the terminals of a switch and is hence connected to one of the wires of the conducting cord 6. The other terminal or contact of the switch comprises a member 9 which is reciprocable transversely with respect to the arms 4 and is provided at one end with a press button 10 whereby it may be operated to control the electric circuit. The middle portion of this member 9 is ring-like so as to clear the center of the tube 8 and it has a pair of divergently arranged resilient arms or wires 11 which when the button 10

is pressed are caused to bear against opposite sides of the tube 8 and thereby close a circuit therethrough, the divergent arrangement of these resilient wires producing a wiping effect which will prevent corroding of the contact surfaces. A wire 12 leads from the switch member 9 and this wire 12 as well as the wire 7 is provided with slightly expansible eyes 13 which are adapted to be connected to the terminals of the heating means for the vaporizer. The wires 7 and 12 are preferably composed of flexible conductors so that they will not interfere with the tilting movements of the hood or upper part of the instrument with respect to the handle.

The rear portion of the hood 1 is formed with a wall 14 which has an annular row of perforations 15 adjacent to its periphery for the exit of air which is exhaled from the respiratory organs, and a partition 16 is also arranged within the hood and is located in front of the rear wall 14, this partition having a similar annular row of perforations 17 for the exit of air. The partition 16 is held in proper spaced relation with respect to the rear wall 14 by an internal flange 18 which abuts against the rear side of the partition 16, and a sleeve 19 is fitted within the internal flange 18 and has its forward end headed over the internal circumference of the partition 16 as shown at 20 in Fig. 2. In this way, displacement of the partition either in a forward or rearward direction is prevented and, moreover, the wall of the hood may also be crimped or reduced in size so as to confine the outer edge of the partition 16 as shown. The space provided between the rear wall 14 of the hood and the partition 16 forms a valve chamber 21 and this valve chamber contains a freely movable valve 22. This valve 22 is adapted to seat against the partition 16 so as to prevent the entrance of air through the perforations 15 and 17, but it is held from engaging the rear wall 14 of the hood so as to permit exit of air through the perforations 15 and 17 by a limiting shoulder 23 which preferably projects rearwardly from the inner circumference of the valve.

The tube 19 provides a passage through which air whether purified or medicated enters the hood and this tube is provided with a valve which will permit the entrance of air to the hood through the tube but will not permit exit of air from the hood through the tube. In the present instance, a spider 24 is fixed within the tube 19, the spider having a stud 25 which projects rearwardly therefrom, a ring 26 is fixed within the tube immediately in rear of the spider 24, and a freely movable valve 27 is interposed between the spider 24 and the ring 26, it being supported in proper operative posi-

tion by the rearwardly projecting stud 25. This valve will permit a flow of air through the tube and into the hood but will seat against the ring 26 and prevent the exit of air from the hood through the tube. To prevent interference between air discharging from the hood through the perforations 15 and 17 and the fresh air being drawn into the hood from the atmosphere, a diaphragm in the form of an annular plate 28 is applied to the exterior of the tube 19, this diaphragm being held rigidly in proper position by spacing rings 29 applied to opposite sides thereof and secured on the exterior of the tube 19, the latter being also provided with suitable shoulders as shown for securing the different parts attached thereto in proper spaced relation. The rear end of the tube 19 projects from the hood a distance sufficient to adapt it for use as coupling means for the attachment of a vaporizing device.

The present invention provides vaporizing means which is capable of effectively medicating or purifying the air before it enters the hood and, moreover, the vaporizing means is combined with a self-feeding reservoir for supplying the vaporizing means with a suitable quantity of medication without requiring the attention of the user. According to the present invention, the vaporizing means, the reservoir, and the self-feeder are combined as a unit and any number of these units may be interchangeably used in connection with one instrument, hence enabling one instrument to be used in the treatment of different diseases and also to be used for various other purposes. Each of these units in the present embodiment of my invention comprises a reservoir composed principally of a bowl 30 made of glass or other suitable material and provided with a cap 31 which has a screw or other suitable detachable connection with the open end of the bowl, the cap being formed with an annular row of perforations 32 to permit the entrance of air to the bowl from the atmosphere and at the rear side of the diaphragm 28, and the cap is formed with a rearwardly projecting constricted or cone-shaped guard 33 which serves to concentrate the inflowing current of air upon the vaporizing means. The cap 31 also secures a cover 34 in cooperative relation with the open end of the bowl, this cover having a liquid-tight connection with the bowl so as to prevent leakage of liquid therefrom and in the present instance a gasket 35 is interposed between the cover and the edge of the bowl to insure a tight joint at this point, the gasket being compressed by the tightening of the screw cap 31.

The cover 34 has a central opening which accommodates the guard 33 of the cap and

also provides a passage 36 for the flow of a current of air around said guard. The cover 34 is also formed with an internal rearwardly projecting flange 37 which is preferably conical or constricted and this flange 37 prevents the escape or spilling of the contents of the bowl, irrespective of the position occupied by the bowl. The flange 37 coöperating with the guard 33 also serves to concentrate the inflowing current of air upon the vaporizing device. This vaporizing device comprises a disk or support 38 having a perforated cover 39 secured thereto and the space between the forward side of the disk 38 and the perforated cover 39 contains a mass 40 of absorbent material of a suitable character. This space just referred to also contains an electrical heating device which in the present instance embodies a heating coil 41 of suitable resistance to generate heat during the passage of an electric current therethrough, the heat thus generated by the coil causing rapid vaporization of the medicament contained in the absorbent mass or pad. The two terminals of the heating coil are connected to pins 42 and 43, these pins being passed rearwardly through the disk 38 and through sleeves 44 which support the disk in proper position, and such pins are provided with terminals to be hereinafter described on the exterior of the device. According to the present invention, the mass 40 of absorbent material is kept automatically supplied with a proper quantity of the liquid or medicament contained in the bowl by a suitable number of feeding cords or wicks 45, a suitable number of these wicks or cords being used which are spaced circumferentially within the bowl and are preferably secured to the interior thereof so that at least one of these wicks or feeding cords will be immersed in the liquid or medicament, irrespective of the position occupied by the bowl. The inner ends of these cords or wicks are passed through an eyelet or tube 46 which is secured centrally of the disk 38 and the terminals of the cords or wicks enter the space between the disk 38 and the cover 39 so as to properly deliver the liquid or medicament to the absorbent mass or pad 40 therein. The vaporizing device is secured within the bowl by a pair of disks 47 and 48, the disk 47 being placed within the bowl and abutting against the rear ends of the sleeves 44, while the disk 48 is applied to the exterior of the bowl, the disks being firmly clamped together by a screw 49, and a packing washer 50 of cork or other appropriate material is applied to fill the central opening in the bowl and thereby produce a fluid-tight joint at this point. The pins 42 and 43 to which the terminals of the electrical heating coil are connected extend through the disk 47 and the opening in the bowl 30 and also through

the metallic sleeves 51 and 52 which are secured to the outer disk 48, these sleeves being preferably arranged divergently as shown in order to separate the terminals to the desired degree. The ends of the sleeves 51 and 52 project beyond the rear face of the disk 48 and have metal caps 53 and 54 fitted tightly thereover, the ends of the pins being secured preferably by soldering to the outer ends of the caps 53 and 54. These two caps just mentioned preferably taper slightly and they are adapted to receive the expansible eyes 13 on the conducting cords 7 and 12, the taper of the caps insuring good electrical contact and also preventing accidental disengagement of the conducting cords. The unit just described and comprising the vaporizer, the reservoir, and the self-feeder is adapted to be detachably connected to the remainder of the instrument. Different means may be provided for detachably connecting these parts. In the present instance the interior of the cap 32 is adapted to slidably fit over the projecting end of the sleeve 19 and has projections 55 adapted to engage the angular recesses 56 in the sleeve, thus providing one form of bayonet joint to detachably unite these parts.

In using the instrument, the vaporizing of the medicament contained in the mass of absorbent material or pad 40 is controlled by the electric switch, the button 10 of the switch being depressed to close the electric circuit and thereby causing the electrical heating device of the vaporizer to heat the material and vaporize it to the desired degree. The degree of vaporization is obviously within the convenient control of the user. As the hood of the device is applied to the face of the user, the inhalations will cause the inlet valve 27 to open and the outlet valve 22 to close, a current of air being then drawn from the atmosphere through the passage 36 and this current of air is concentrated upon the vaporizing device which is centered at approximately the apex of the guard 33. This inflowing current of air will take up the medicated vapor and will flow therewith through the interior of the guard 33, thence through the tube 19 and the valve which at this time is open, and into the hood and from the latter, the medicated vapor is inhaled into the respiratory organs. Exhalation will cause a closing of the valve 27 and opening of the valve 22, waste of vapor by being blown into the atmosphere being thereby avoided and the exhaled air and vapor is discharged into the atmosphere through the perforations in the rear of the hood.

The device may be used as a respirator by removing the vaporizing attachment and using the hood and handle, the valves operating in the same manner as hereinbefore described. Also the same instrument can

be used for the treatment of different diseases by substituting vaporizing devices containing medicaments of different kinds.

I claim as my invention:—

5 1. An inhaler comprising, in combination, a hood or face-piece, a reservoir coöperative therewith and adapted to contain a medica-
10 ment in liquid form, a vaporizer attached to the reservoir and having means for feeding the medicament thereto from the reservoir, and means for causing the passage of air
15 past the vaporizer and to the hood or face-piece and for confining the liquid medica-
ment in the reservoir irrespective of the po-
sition occupied thereby.

2. An inhaler comprising, in combination, a hood, and a unit having means for detach-
ably connecting it to the hood, said unit
20 comprising a reservoir to contain a medica-
ment in liquid form, a vaporizer fixed to the reservoir, means for feeding the medicament
from the reservoir to the vaporizer irrespec-
25 tive of the position occupied by such parts, and means for confining the liquid medica-
ment in the reservoir irrespective of the po-
sition occupied thereby and for directing a
current of air through the reservoir and
past said vaporizer.

3. An inhaler comprising, in combination,
30 a hood, and means attachable and detach-
able as a unit with respect to said hood, such
means comprising a liquid-containing reser-
voir, a vaporizer fixed to the reservoir and
having means for feeding liquid thereto
35 from the reservoir, and a member confining
the liquid in the reservoir and operative to
direct a current of air past the vaporizer.

4. An inhaler comprising, in combination,
a hood, a bowl-shaped reservoir to contain a
40 liquid medicament, a vaporizer secured in
the reservoir and having means for feeding
the medicament thereto from the reservoir,
a member forming a closure for the opening
in the reservoir and operative to direct a
45 current of air past said vaporizer, and
means for detachably connecting the reser-
voir, vaporizer and member as a unit to
said hood.

5. In an inhaler, the combination of a
50 hood or face piece, a vaporizer, a reservoir
having means for feeding a medicament to
the vaporizer, means for conducting a cur-
rent of air past said vaporizer and means
for preventing spilling of the medicament
55 from the reservoir irrespective of the po-
sition occupied thereby.

6. In an inhaler, the combination of a
hood or face piece, a vaporizer, a reservoir
having means for feeding a medicament
60 therefrom to the vaporizer, and a device
forming an exterior passage for directing a

current of air to the vaporizer and an exter-
rior passage for conducting vaporized air
therefrom.

7. In an inhaler, the combination of a 65
hood or face piece, a vaporizer, a reservoir
having means for feeding a medicament
therefrom to the vaporizer, and a conical
guard contained in the reservoir and sur-
rounding the vaporizer for directing a cur- 70
rent of air to the vaporizer and for conduct-
ing the vaporized air therefrom.

8. An attachment for inhalers compris-
ing, in combination, a liquid reservoir, a va-
porizer, means for conducting a current of 75
air past the vaporizer, means for feeding a
substance from the reservoir to the vapor-
izer, and a conical cover to prevent spilling
of liquid from the reservoir.

9. An attachment for inhalers compris- 80
ing, in combination, a reservoir, a conical
cover to prevent spilling of liquid irrespec-
tive of the position occupied by the reser-
voir, a vaporizer, heating means for the va-
porizer, means for conducting a current of 85
air past the vaporizer, and means for sup-
plying a medicament from the reservoir to
the vaporizer.

10. An attachment for inhalers compris-
ing, in combination, a reservoir adapted to 90
contain a liquid, a vaporizer, means for
feeding the liquid from the reservoir to the
vaporizer, and a cover for the reservoir
having a flange projecting into the reser-
voir and forming an air passage surround- 95
ing the vaporizer and also an air passage
which surrounds such flange.

11. An attachment for inhalers compris-
ing, in combination, a reservoir adapted to
contain a liquid, a vaporizer, means for 100
feeding the liquid from the reservoir to the
vaporizer, and a cover for the reservoir hav-
ing a flange projecting into the reservoir,
and a cap applied to the reservoir and hav-
ing a guard arranged within said flange of 105
the cover to form a passage for conducting
air to the vaporizer and for conducting va-
porized air therefrom.

12. An attachment for inhalers compris-
ing a bowl-shaped reservoir adapted to con- 110
tain a medicament, a vaporizer, and absorb-
ent conductors distributed circumferentially
within the reservoir and leading to the va-
porizer for feeding the medicament thereto.

In testimony whereof I have hereunto set 115
my hand in presence of two subscribing wit-
nesses.

ELWIN K. HILL.

Witnesses:

L. E. YAGGI,
H. K. YAGGI.