Aug. 23, 1949. F. M. RISCH 2,479,967

CHLORINE INHALATOR

Filed Nov. 15, 1946 2 Sheets-Sheet 1

FIG. 1.

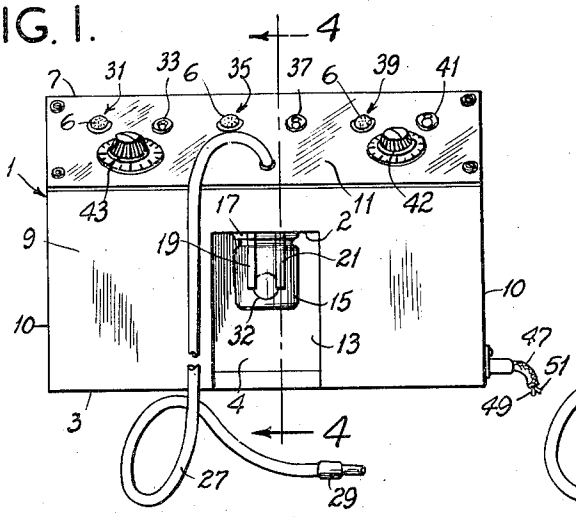


FIG. 2.

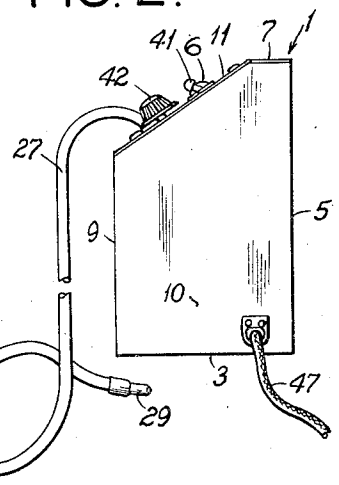
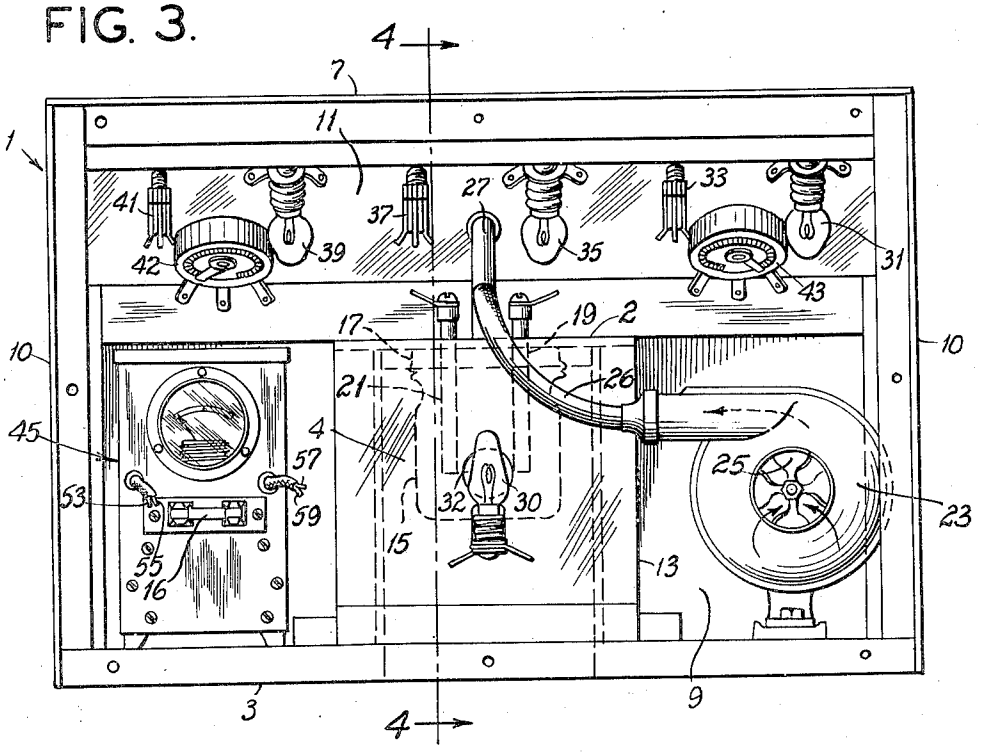


FIG. 3.



Frank M. Risch,
Inventor.
Haynes and Koenig
Attorneys.

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FIG. 4.

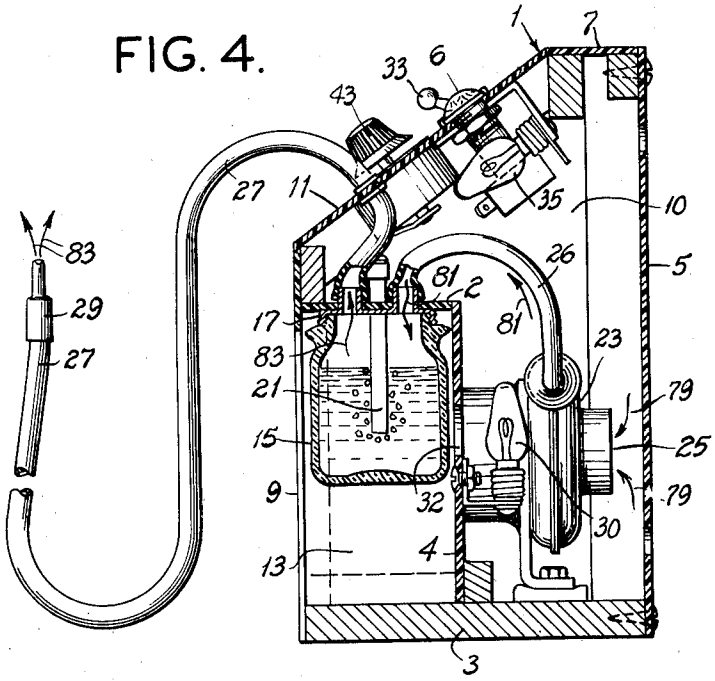
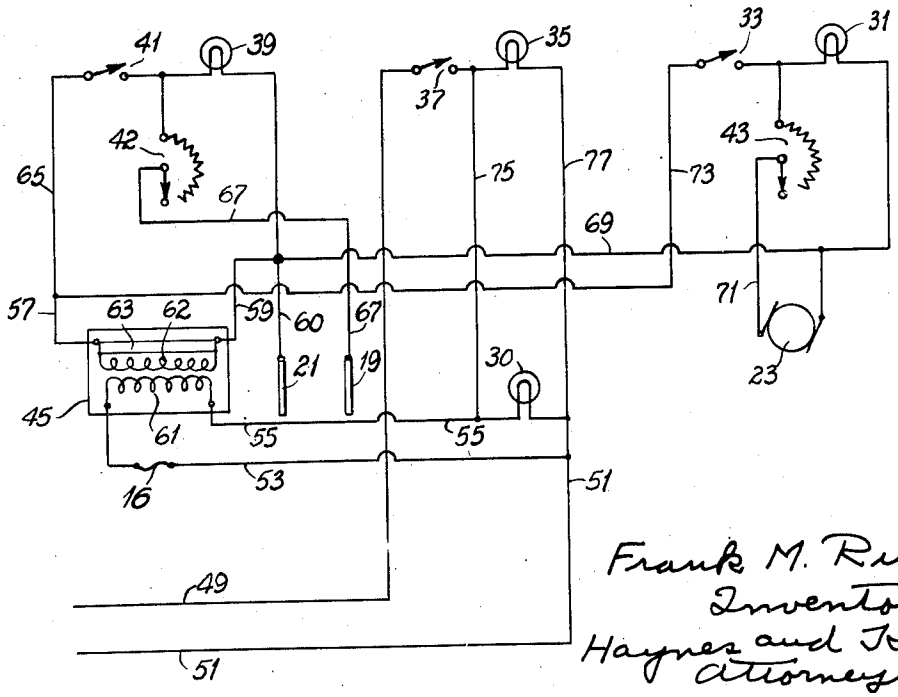


FIG. 5.



Frank M. Risch,
Inventor.
Haynes and Koenig
Attorneys.

Patented Aug. 23, 1949 2,479,967

UNITED STATES PATENT OFFICE

2,479,967

CHLORINE INHALATOR

Frank M. Risch, St. Louis, Mo.

Application November 15, 1946, Serial No. 709,984

2 Claims. (Cl. 128—185)

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This invention relates to therapeutic devices and more particularly to therapeutic inhalant generators.

Among the several objects of this invention may be noted the provision of a therapeutic device that dispenses electrolytically generated gases for medicinal application; the provision of a therapeutic device that may be simply and accurately controlled and is convenient for prescription by the medical profession; the provision of a therapeutic device of the class described which may operate from standard current and in which the important circuit voltages are physiologically safe; the provision of a therapeutic device in which the phases of gas generation are visually indicated; and the provision of a therapeutic device of the class indicated which is compact, reliable and economical. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a front elevation of a housing for the device of the invention;

Fig. 2 is a side elevation;

Fig. 3 is a rear view with a back panel removed, wiring being omitted for clarity;

Fig. 4 is a vertical section taken along line 4—4 of Fig. 1; and,

Fig. 5 is a wiring diagram of the electrical components.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now to the drawings, numeral 1 indicates a portable console case comprising a base 3, a rear panel 5, a top panel 7, a front panel 9, end panels 10, and a control and indicator panel 11. The latter is mounted at a convenient angle with and adjoining the panels 7 and 9. In the front panel 9 is a centrally recessed compartment 13 to permit a clear view of a transparent electrolyte container 15 which by means of an air-tight cap 17 is detachably affixed to the underside of the top of recess 13. The cap 17 is fastened permanently to the top of the recess 13. Two electrodes, an anode 19 and a cathode 21, are also affixed to the underside of the top 2 of recess

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13. They extend through and are insulated from the top 2 and cap 17. A blower 23 is mounted on base 3 in the interior of the console 1 and is provided with an air inlet 25 and a section of tubing 26 which serves to conduct the output air stream to the electrolyte container 15. The electrolyte container 15 is also provided with an outlet, including flexible tubing 27 equipped with a nozzle 29 for dispensing the electrolytically generated gas and air mixture. An illuminating lamp 30 is mounted in line with a hole 32 in a rear panel 4 of recess 13 and is adapted to illuminate the electrolyte, as well as the action within the electrolyte of container 15.

Visible through refracting glass buttons 6 from the exterior of console 1 and mounted on the underside of control and indicator panel 11 are three signal lamps. These include a blower indicator lamp 31 adapted to indicate the energization of blower 23 by a blower power switch 33; a master pilot lamp 35 adapted to be energized by a master power switch 37; and a generator indicator lamp 39 adapted to indicate the energization of the electrodes 19 and 21 by a generator switch 41. The switches 33, 37 and 41 are mounted on and extend through the control and indicator panel 11. Also affixed to the underside of the control and indicator panel 11 are two rheostats, a generator control rheostat 42 adapted to adjust the potential difference between electrodes 19 and 21, and a blower speed control rheostat 43 adapted to vary the speed of the blower 23.

Power is supplied to the console and components by a cable 47 including two wires 49 and 51, which may be connected to an ordinary 110 volt A. C. source. A rectifier unit 45 adapted to energize the blower 23 and the electrodes 19 and 21 is mounted on base 3 in the interior of console 1. The rectifier unit 45 is supplied with alternating current by means of wires 53 and 55 and the low-voltage D. C. output of the rectifier is derived from wires 57 and 59. Rectifier 45 is protected from any overload by a fuse 16.

Referring now to the wiring diagram of Fig. 5, alternating current is supplied through lines 49 and 51 to the rectifier unit 45 through a circuit consisting of wire 49, switch 37, wire 75, wire 55, a transformer coil 61, wire 53 and wire 51. The electrolyte illuminating lamp 30 and the master pilot lamp 35 are connected in parallel with each other by means of wires 75 and 77. Hence these lamps 30 and 35 are in parallel with the input circuit to the rectifier unit 45, being energized only with rectifier unit 45 and by the action of

the master power switch 37. The lamps 30 and 35 are of the 110 volt type.

The rectifier unit 45 includes the step-down transformer coils 61 and 62 and a rectifying component 63. The low-voltage D. C. output (6 volts, for example) of the rectifier unit 45 is impressed across the electrodes 19 and 21. The circuit to the electrode 21 is completed directly through wires 59 and 60. The circuit to the electrode 19 includes wire 57, wire 65, generator switch 41, generator control rheostat 42 and wire 67. The generator indicator lamp 39 is connected in parallel with electrodes 19, 21 and the rheostat 42. The electrodes and the lamp will be energized only when the gas generator switch 41 is closed. The action of lamp 39 is thus independent of the action of the generator control rheostat 42 but dependent upon the generator switch 41.

The circuit of blower motor 23 includes wires 59, 69, blower 23, wire 71, blower speed control rheostat 43, blower power switch 33, wire 73 and wire 57. The blower indicator lamp 31 is connected in parallel with the blower 23 and rheostat 43 and is energized only when the blower power switch 33 is closed. The blower indicator lamp 31 is independent of the action of blower speed control rheostat 43 but dependent upon the blower control switch 33.

The lamps 31 and 39 are of the low-voltage type, being energized by the voltage impressed across electrodes 19 and 21.

The following operating procedure is illustrative. The electrolyte container 15 is detached from the airtight cap 17 and is partially filled with an electrolyte. For purposes of illustration the electrolyte used may be a solution of sodium chloride and water. The solution may be made to any desired concentration but a saturated solution is preferable. The container 15 is then reaffixed to the cap 17 and the supply line 47 is energized by alternating current. The master power switch 37 is then closed, which energizes the master pilot lamp 35 and the electrolyte illuminating lamp 30. The blower power switch 33 may then be closed, energizing the blower indicator lamp 31 and the blower 23. The speed of the blower 23 may then be controlled by adjustment of the blower speed control rheostat 43. Air will be drawn through the inlet 25 (Fig. 4) as indicated by arrows 79. This air will be delivered through tubing 26 to the interior of the electrolyte container 15, as indicated by arrows 81.

The generator switch 41 is then closed, which energizes the generator indicator lamp 39 and the electrodes 19 and 21. The potential applied across electrodes 19 and 21 may be controlled by the adjustment of the generator control rheostat 42. With a D. C. potential applied across the electrodes 19 and 21, which are immersed in the salt solution, the folowing chemical reaction will occur:

$$2NaCl+2H_2O \xrightarrow{\text{Elect.}} H_2\uparrow + 2NaOH+Cl_2\uparrow$$

The chlorine generated by the above reaction will be liberated as a gas at the anode 19 and the gaseous hydrogen will be liberated at the cathode 21. These gaseous products will be thoroughly mixed with the air circulating in the unfilled portion of the electrolyte container 15 and will be forced through tubing 27 and nozzle 29, as indicated by arrows 83.

Complete control of the velocity of the mixed gaseous output of nozzle 29 is controlled by the adjustment of the blower speed control rheostat

43, while the amount of chlorine generated is controlled by the adjustment of the generator control rheostat 42. For example, if a high concentration of chlorine is desired in the gas stream of nozzle 29, the rheostat 42 is adjusted to minimum resistance. Similarly, if a maximum concentration of air is desired in the output gaseous mixture of nozzle 29, the rheostat 43 is adjusted to minimum resistance. It is to be understood that there is a cooperative interaction between the adjustments of rheostats 42 and 43 in controlling the medicinal gas concentration at the outlet of nozzle 29. For example, if the generator rheostat 42 is set to any desired adjustment and the blower speed control rheostat 43 is varied, the amount of chlorine generated will remain constant but the chlorine concentration at the outlet of nozzle 11 will vary directly with the effective resistance of rheostat 43.

The electrolyte in container 15 is illuminated by lamp 30 and the amount of chlorine generated may be determined visually by the quantity and activity of the gas bubbles around the electrodes 19 and 21. It is to be understood that electrolytes other than a solution of sodium chloride and water may be used. Any electrolyte from which gases of therapeutic value can be generated by electrolysis is usable in this device. It has been found that a Mallory battery booster, type 3C, satisfactorily fulfills the requirements for the transformer and rectifier 45 of the present invention. This converts 105–120 volt, 60 cycle A. C. to 6 volt D. C., consuming about 50 watts at 4–2 amperes. This type of apparatus is described in U. S. Patent 1,751,359, but equivalents may of course be used. Although the circuit as shown in Fig. 5 utilizes alternating current as a source of power, a storage battery could be substituted for the rectifier unit 45.

The gaseous mixture of chlorine generated may advantageously be used (for example) to relieve nasal congestion, and can be simply and accurately controlled by the physician or another person with the aid of the visual indication described above.

The device is very convenient for self-medication by a patient. This is because the electrolytic action in said container is visible by light from said lamp through said opening by a person for whom medicinal gas is being dispensed from said flexible outlet while said person may reach the controls. Furthermore, the quick-detachable connection from the outside of the case for the electrolyte container in a position in which the bubbling electrolytic action is visible, is a great convenience.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A chlorine inhalator for generating a medicinal gas comprising a portable case, a control panel thereon, a front on said case having a recessed compartment open to the outside of the case, insulated and fixedly mounted electrodes extending downward into said compartment and insulated therefrom, a transparent container for an electrolytic salt solution, quick-detachable means for attachment of said container to the

top of the recess and around said electrodes, said compartment having an opening located behind an attached container, a signal lamp within the case and behind said opening, an electric air blower within the case having an inlet attachment to said quick-detachable connection, said quick-detachable connection having a flexible-tube outlet for dispensing gas, rectifier means within the case for supplying low-voltage direct current to the electric blower and to the electrodes from a relatively high-voltage A. C. source, rheostat control means in the case for the electrodes and for the blower and controllable from said panel, independent signal means on the panel for the blower and the electrodes, independent switch means on the panel for the blower and the electrodes and their respective signal means, master switch means on the panel for controlling energization of said rectifier from said A. C. source, and an independent signal means on the panel associated with said master switch means to indicate energization of said rectifier, said lamp behind said opening being energized directly from said A. C. source when the master switch is closed.

2. A chlorine inhalator for generating a medicinal gas comprising a portable case, a control panel thereon, a front on said case having a recessed compartment open to the outside of the case, insulated and fixedly mounted electrodes extending downward into said compartment and insulated therefrom, a transparent container for an electrolytic salt solution, quick-detachable means for attachment of said container to the

top of the recess and around said electrodes, said compartment having an opening located behind an attached container, a signal lamp within the case and behind said opening, an electric air blower within the case having an inlet attachment to said quick-detachable connection, said quick-detachable connection having a flexible-tube outlet for dispensing gas, rectifier means within the case for supplying low-voltage direct current to the electrodes from a relatively high-voltage A. C. source, rheostat control means in the case for the electrodes and controllable from said panel, independent signal means on the panel for indicating energization of the blower and the electrodes, independent switch means on the panel for the blower and the electrodes and their respective signal means, master switch means on the panel for controlling energization of said rectifier from said A. C. source, and an independent signal means on the panel associated with said master switch means to indicate energization of said rectifier, said lamp behind said opening being energized directly from said A. C. source when the master switch is closed.

FRANK M. RISCH.

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The following references are of record in the file of this patent:

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