

Dec. 21, 1948.

W. J. MULLIKIN

2,456,724

RESPIRATOR

Filed May 6, 1946

2 Sheets-Sheet 1

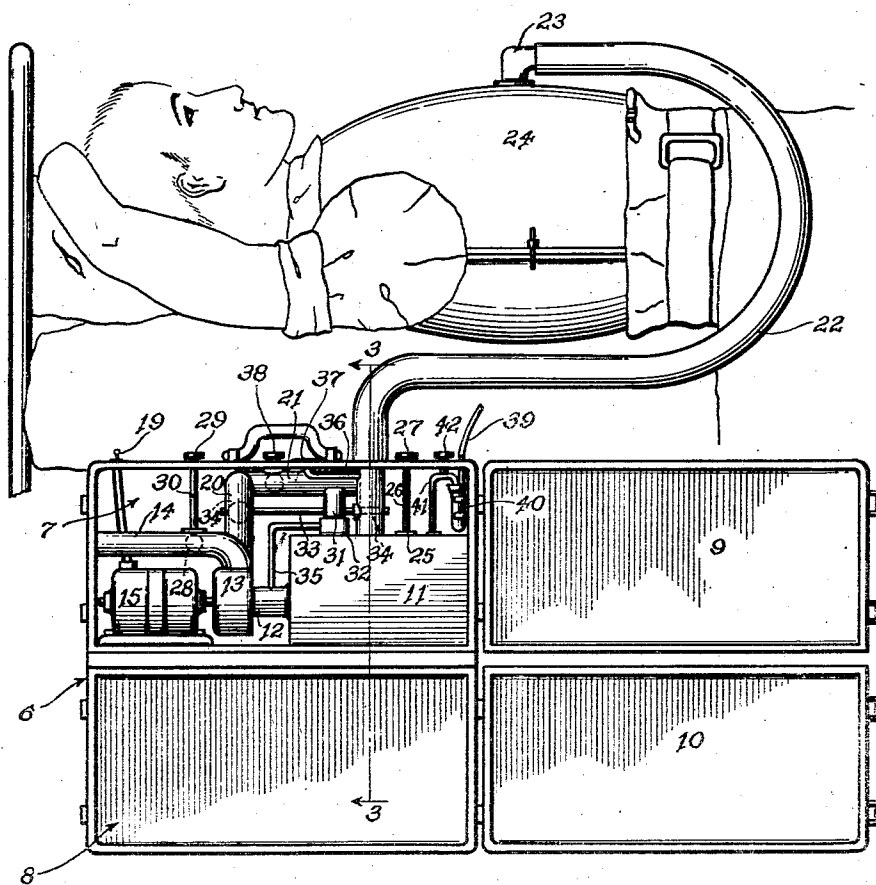
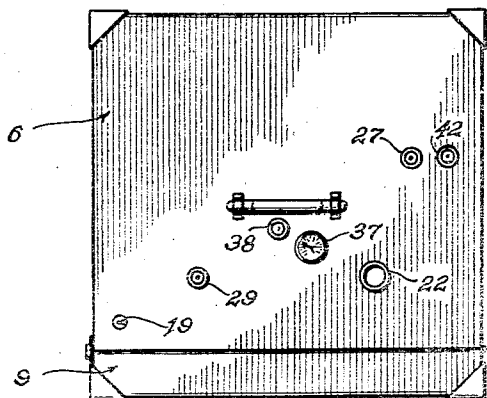


Fig. 1.



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Fig. 2. Bernard F. Lawley
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2 Sheets-Sheet 2

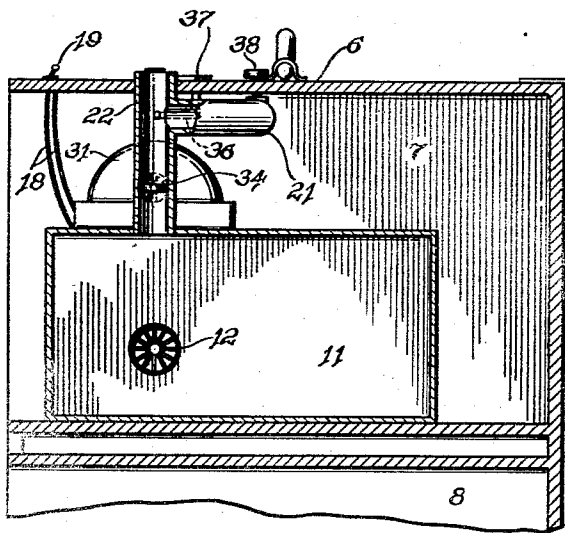


Fig. 3.

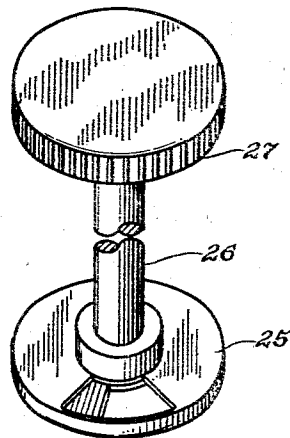


Fig. 5.

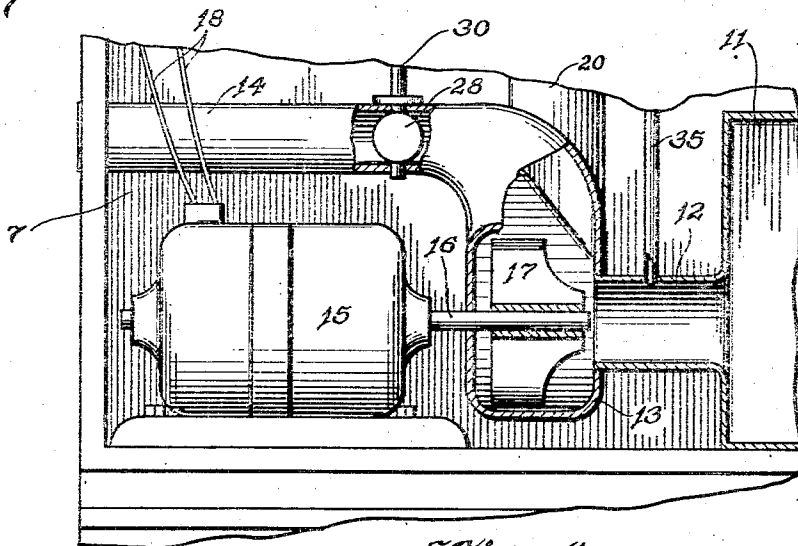


Fig. 4.

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RESPIRATOR

Wilbur J. Mullikin, Washington, D. C.

Application May 6, 1946, Serial No. 667,594

4 Claims. (Cl. 128—30)

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This invention comprises a respirator of the general type shown in my co-pending application S. N. 523,245, now abandoned, of which this application is a continuation-in-part, an object of the invention being to supplement the respirator with variable pressure means to effect application of negative pressure, or positive pressure in varying degrees, to the chest area of the patient.

Further objects of the invention are to provide variable pressure means completely within the control of the operator to instantly increase or diminish pressure over the chest area; to include in the respirator, aspirating means operable *per se* or in conjunction with the respirator; to provide mechanism in the respirator for varying the interval of negative and positive pressure over the chest area; and to provide a compact unit embodying the entire respirator and aspirator apparatus together with a shield case.

Other objects of the invention will be understood from the following description of the present preferred form of the invention taken in connection with the accompanying drawings, wherein;

Figure 1 is an elevational view of a respirator constructed in accordance with the present invention illustrating its application, the respirator case being open to disclose details of the respirator;

Figure 2 is a top plan view of the respirator case in a closed position;

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 1 looking in the direction of the arrows;

Figure 4 is a detail fragmentary sectional view of the respirator mechanism showing to advantage the manner of mounting the fan and motor and its relationship to the vacuum chamber; and

Figure 5 is a perspective view of one of the respirator valves and operating means therefor.

The device of the present invention includes a portable case 6 which is provided with upper and lower compartments 7 and 8 respectively. Correspondingly, the case includes upper and lower doors 9 and 10 respectively for closing said compartments in an obvious manner.

The upper compartment 7 of the case is provided with a vacuum chamber 11 which is preferably mounted on the floor of the upper compartment and has one end thereof contiguous to one end of the compartment.

The opposite end of the chamber is provided with an opening, the wall of which issues into

a nipple 12. The opposite end of the nipple is secured to and in communication with a fan housing 13, the upper end of the housing being extended to provide a conduit 14 which opens through the end wall of the compartment 7 opposite to that with which the chamber 11 is engaged. Also mounted on the floor of the compartment 7, in proximity to the chamber 11, is a power unit 15 which, in the present instance, consists of an electric motor, the power shaft 16 of which projects beyond one end of the motor into the housing 13 and carries a fan 17. The fan is fixedly secured to and rotatably operated by the power shaft 16 within the confines of the housing 13. Circuit wires 18 extend from the motor 15 through the top of the case 6 and are engaged with a switch 19. The housing 13 and horizontal conduit 14 are in communication with one end of a vertical conduit 20, the upper terminal of which latter issues into a horizontal branch 21, the free end of which latter communicates with one end of a tube 22. The tube 22, as shown to advantage in Figure 1, opens into, at one end, the vacuum chamber 11, the opposite end thereof being engaged with an elbow 23 which extends from and is secured to a torso embracing jacket 24.

With the present invention, operation of the motor 15 creates a vacuum in the chamber 11 in order to effect positive and negative pressures over the chest area through the tube 22 and jacket 24. For the purpose of changing the intensity of the pressures, I employ a valve 25 mounted in the top of the chamber 11, the valve being equipped with a shaft 26, the shank of which carries a knurled knob 27 which is mounted on the upper end of the shaft 26 outside of the case 6. By turning the knob 27, the opening in the valve head 25 is increased or diminished as will be apparent upon reference to Figure 5 of the drawing, to correspondingly increase or decrease the amount of atmospheric air which is permitted to enter the chamber 11. The air withdrawn from the chamber 11 by the fan 17 passes through the nipple 12, and housing 13 and is vented to the atmosphere through the conduit 14. Interruption of the passage of air through the conduit 14 is effected by a valve 28 mounted in the conduit 14 and operated by a knurled knob 29, through the shaft 30 as advantageously illustrated in Figure 1 and Figure 4. In order to alternate the positive and negative pressure and regulate the intervals of positive and negative pressure in the tube 22, I employ mechanism generally designated 31. This mechanism includes a vacuum type motor

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32 of the type used for the operation of certain windshield wipers, the motor being operatively connected to a shaft 33. One end of the shaft carries a valve 34 of the butterfly type which is movably mounted within the tube 22 at a point in close proximity to the vacuum chamber 11. The opposite end of the shaft 33 carries a twin valve 34' which is mounted for operation in the vertical conduit 20. The twin valves 34 and 34' are mounted at right angles to each other so that when one is open the other is closed in order to effect a pulsation through the tube 22 when the motor 15 is operated. Preferably, the vacuum type motor 32 is in communication with the chamber 11 through the nipple 12 by means of an auxiliary pipe 35. One end of the pipe is in communication with the motor 32 and the opposite end is tapped into the nipple 12 as shown to advantage in Figure 1. I have found that the pressure in the nipple is more constant and this results in more efficient operation of the motor 32 for effecting the pulsating pressures in the tube 22 and correspondingly over the chest area of the patient. The frequency of the pulsations may be regulated by means in the vacuum type motor 32 for controlling the amount of air intake to the motor.

In order that the pressure in the tube 22 may be at all times known to the operator, I provide a by-pass 36 from the tube 22 within the confines of the compartment 7, the by-pass being in communication with a gauge 37 mounted in the top of the case 6.

In order to close communication through the horizontal portion 21 of the conduit, I provide a valve, as shown by the dotted lines in Figure 1, which is operated by a wheel 38.

The device of the present invention also contemplates the use of an aspirator which may be used per se or in conjunction with the respirator. In the present instance, the aspirator is shown to comprise a tube 39, one end of which is adapted for engagement with a body cavity, the opposite end extending through the top of the case 6 into a receptacle 40 suspended within the compartment 7 of the case. The receptacle is detachably engaged to a wall of the compartment by flexible fingers and is preferably closed by a rubber stopper through which the tube 39 extends. The stopper is also provided with a further opening through which one end of a suction tube 41 extends, the opposite end of the tube being engaged with a valved fitting 42 which is carried by and communicates with the vacuum chamber 11 as advantageously illustrated in Figure 1. By this arrangement, the receptacle 40 may be expeditiously removed from the compartment 7 for sterilization and cleaning at the option of the user.

The compartment 8 serves as a shield case for the storage of the so-called jacket and appurtenances associated therewith. It is of course to be understood that the jacket 24 is of standard con-

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struction as is also the tube 22 and associated parts thereof. By providing two compartments, a compact unitary structure is provided in which all the necessary apparatus and equipment may be personally carried.

Although I have herein described a preferred form of this invention, I am aware that various changes may be made therein within the scope of the claims hereto appended.

What I claim is:

1. A respirator comprising a torso embracing jacket, an air pump having its vacuum end and its pressure end in communication with said jacket, valve means for alternately closing communication from said jacket to the vacuum end and the pressure end of said pump, and a vacuum motor in communication with the vacuum end of said pump to automatically operate said valve.

2. A respirator comprising a torso embracing jacket, an air pump, a tube providing communication between said jacket and the vacuum end of said air pump, a second tube providing communication between said jacket and the pressure end of said air pump, valve means in the tubes to close one tube when the other is open, and a vacuum-type driving motor for the valve means, the motor being in communication with the vacuum end of the air pump.

3. A respirator comprising a torso embracing jacket, an air pump, a tube providing communication between said jacket and the vacuum end of said air pump, a second tube providing communication between said jacket and the pressure end of said air pump, butterfly valves in said tubes and on a common shaft, the valves being disposed to close one tube when the other is open, and an alternating vacuum-type motor for driving said shaft, the motor being in communication with the vacuum end of the air pump.

4. A respirator comprising a torso embracing jacket, a vacuum chamber, a tube connecting said jacket to said vacuum chamber, a valved opening in a wall of said vacuum chamber permitting controlled entry of air from atmosphere into said chamber, an air pump for pumping air from said chamber, said pump having an air discharge conduit leading to said tube, a vacuum motor in communication with said vacuum chamber, and valves in said tube and said conduit, said valves being actuated by said vacuum motor to alternately close said tube and said conduit.

WILBUR J. MULLIKEN.

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

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