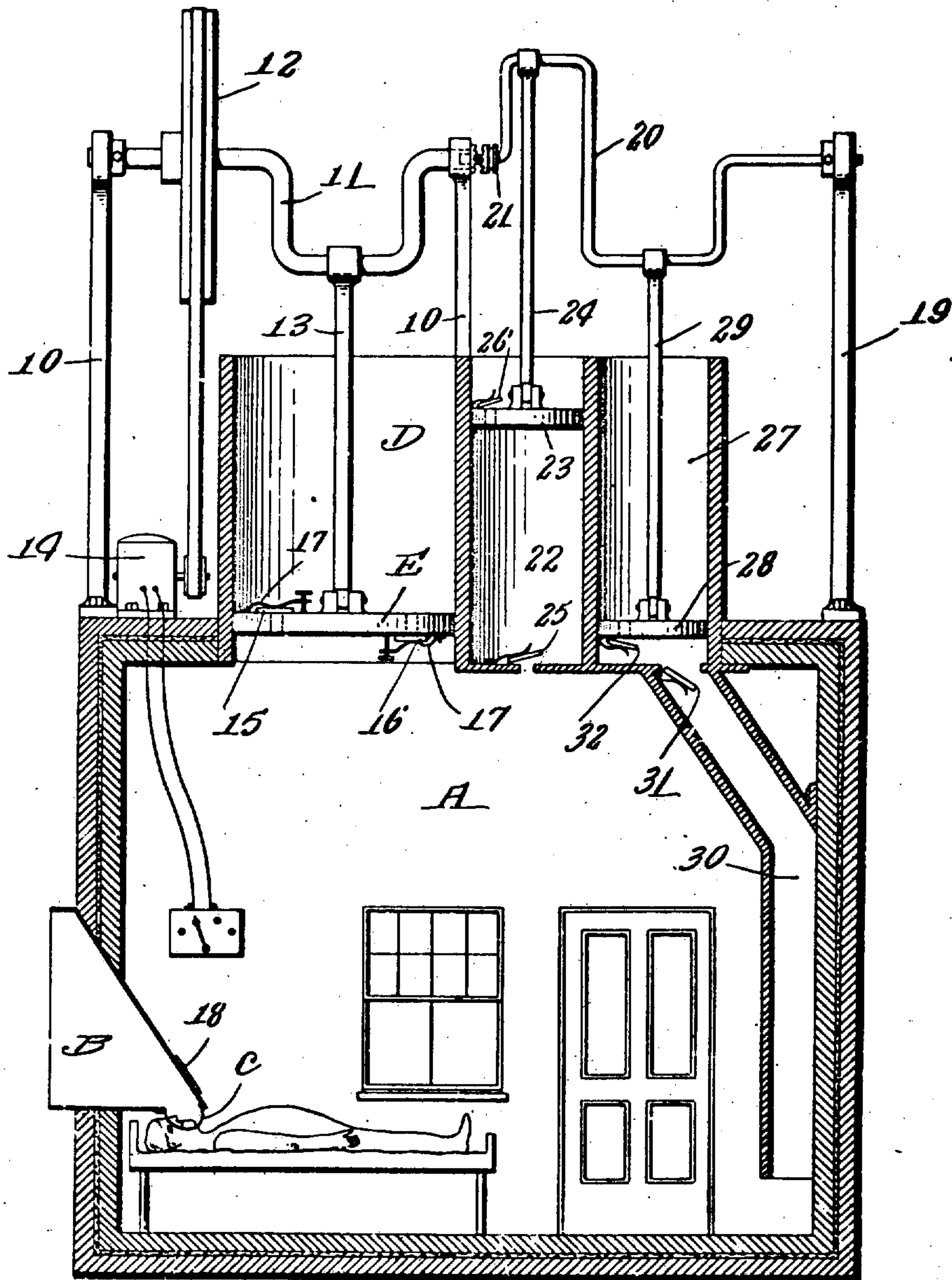


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RESPIRATION APPARATUS.
APPLICATION FILED JULY 10, 1905.

899,225.

Patented Sept. 22, 1908.



Witnesses:
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UNITED STATES PATENT OFFICE.

PETER LORD, OF WORCESTER, MASSACHUSETTS; MARTHA V. LORD ADMINISTRATRIX OF SAID PETER LORD, DECEASED.

RESPIRATION APPARATUS.

No. 899,225.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed July 10, 1905. Serial No. 268,998.

To all whom it may concern:

Be it known that I, PETER LORD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Respiration Apparatus, of which the following is a specification.

The object of this invention is to produce artificial respiration in a practicable way, which consists in supplying the patient with a supply of fresh air, and in alternately decreasing and increasing the air pressure on the patient's chest or body so that the chest will rise and fall and the patient will be caused to breathe the supply of fresh air without muscular effort.

Further objects and advantages of the invention will appear hereinafter.

The invention may be practiced in many ways.

I have shown in the accompanying drawings forming part of this application for patent, a form of apparatus for carrying out the invention.

The figure represents a cross-section of an apparatus which may be used in hospitals or built into buildings.

This apparatus is designed for patients who are sick, or who are to be operated upon surgically.

A designates a room or compartment which is made air tight, and which is provided with an air-tight-fitting door. In the side of the room is formed a supplying apparatus or funnel B through which fresh air may be supplied to the patient. The end of the funnel B is provided with a rubber cap C which has a hole therein so that the cap can fit over the face of the patient and cover his nose and mouth. Sometimes instead of using this funnel, I may use a fixture connected by a flexible pipe to a source of air supply, and having a funnel at its end like the ordinary anesthetic funnel used with nitrous oxid, etc.

On the top of the compartment is formed a large cylinder D, fitting in which is a piston E. Journaled in brackets 10—10 is a crank shaft 11, secured on which is a pulley 12. The crank shaft 11 is connected by a pitman 13 to the piston E. A motor 14 is arranged on top of the compartment and is belted to drive the pulley 12. The motor is controlled by a suitable rheostat arranged inside of the

compartment. The piston E is provided with a valve 15 on its top face and a valve 16 on its lower face. These valves are kept normally closed by means of springs 17, the tension of which can be adjusted by suitable screws.

In operation, the patient is placed in position so that his mouth and nose receive the supply of fresh air at atmospheric pressure. The motor is started in operation and is adjusted to reciprocate the piston E at about the number of respirations desired, say twenty per minute. As the piston E moves up the air in the compartment is rarefied; that is, say it is reduced from 15-lbs. pressure to 13-lbs. pressure. This will lift the chest of the patient and will cause him to inhale the fresh air. On the down stroke of the piston, the air in the compartment is brought back to atmospheric pressure, and is increased to, say 16 or 17 lbs. This will cause the chest of the patient to collapse and will cause him to expel the air from his lungs. By adjusting the valves the desired pressures can be obtained in the compartment. In this way the patient will be caused to breathe without muscular effort, and by adjusting the motor the rate of breathing can be established to suit the conditions of the case.

The apparatus is particularly useful in cases where artificial respiration is of advantage. The apparatus may be also advantageously employed when operations are to be performed and the patient put under the influence of anesthetics.

The funnel B is provided with a slide covering an opening. The anesthetic can be applied to the patient through this opening. By the use of the apparatus before described, the patient's breathing can be kept regular or at the determined rate.

When operations are to be performed, or when it is necessary for persons to be in the compartment with the patient, it is desirable to supply fresh air to the compartment and to withdraw the foul air, as the compartment is usually made as small as possible so that the piston E will not have to be made of very large size. To perform this function the following apparatus is provided. An additional bracket 19 is secured to the top of the compartment. A double throw crank-shaft 20 is journaled in said bracket 19 and in the middle bracket 10. A

clutch 21 is provided so that this crank-shaft 20 can be connected to the crank-shaft 11 to turn therewith.

22 designates a cylinder arranged on the top of the compartment, working in which is a piston 23 which is connected by pitman 24 to one throw of the crank-shaft 20. A valve 25 is provided in the bottom of the cylinder 22, and a valve 26 is arranged in the piston 23. These valves are provided with springs so that the rise and fall of pressure in the compartment will not interfere with the operation thereof. Thus it will be seen that the cylinder 22 and piston 23 form a suction pump so that a volume of air will be withdrawn from the room for each revolution of the crank-shaft. 27 designates another cylinder fitted in which is a piston 28 which is connected by pitman 29 to the other throw of the crank-shaft 20. A tube 30 is connected to the bottom of the cylinder 27 and is carried down to the bottom of the compartment. Valves 31 and 32 are arranged in the bottom of the cylinder 27 and in the piston 28 as shown. These valves are also provided with suitable springs so that the rise and fall of pressure in the compartment from the piston E will not affect the operation of the same. It will be noticed that this arrangement forms a force pump for forcing fresh air into the bottom of the compartment, and that the pistons 23 and 28 will reciprocate in opposition in their cylinders. This arrangement is provided so that just as much air will be forced in as is pushed out, so that the operation of these pistons will not affect the air-pressure in the compartment, and will not affect the rise and fall of air pressure from the reciprocations of the piston E.

Many other forms of mechanism for practicing my invention may be devised without departing from the scope of my invention as expressed in the claims.

Having thus fully described my invention, what I claim and desire to secure by Letters-Patent of the United States is:—

1. In an apparatus of the character described, the combination of a closed compartment, a motor mounted thereon, a crank-shaft supported by the compartment

and operated by the motor, a cylinder opening into the compartment, a piston in the cylinder connected with said crank-shaft to be operated thereby, whereby the pressure in the compartment may be alternately increased and diminished, and means detachably connected with the crank-shaft for changing the air in the compartment without affecting the pressure therein.

2. In an apparatus for producing respiration the combination of a closed compartment, means for supplying fresh air to a patient placed therein, means for increasing and decreasing the air pressure therein, and means for withdrawing air from and forcing air into said compartment without affecting the rise and fall of the pressure therein.

3. In an apparatus for producing respiration the combination of a closed compartment, a power-driven pump connected thereto to increase and diminish the pressure therein, a suction pump, and a forcing pump also connected therewith, said suction and forcing pumps being set to work in opposition.

4. An apparatus for producing respiration comprising a closed compartment, a large cylinder connected therewith, a piston arranged in said cylinder, a motor for reciprocating said piston, a suction pump and a forcing pump connected with said compartment and set to work in opposition, and connections for operating the suction and force pump in unison with the piston in the large cylinder.

5. An apparatus for producing respiration comprising a closed compartment, a pump connected therewith for increasing and diminishing the pressure therein, a suction and force pump also connected therewith and set to act in opposition, and an inlet pipe for the force pump extending down to the bottom of the compartment.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

PETER LORD.

Witnesses:

PHILIP W. SOUTHGATE,
E. M. ALLEN.