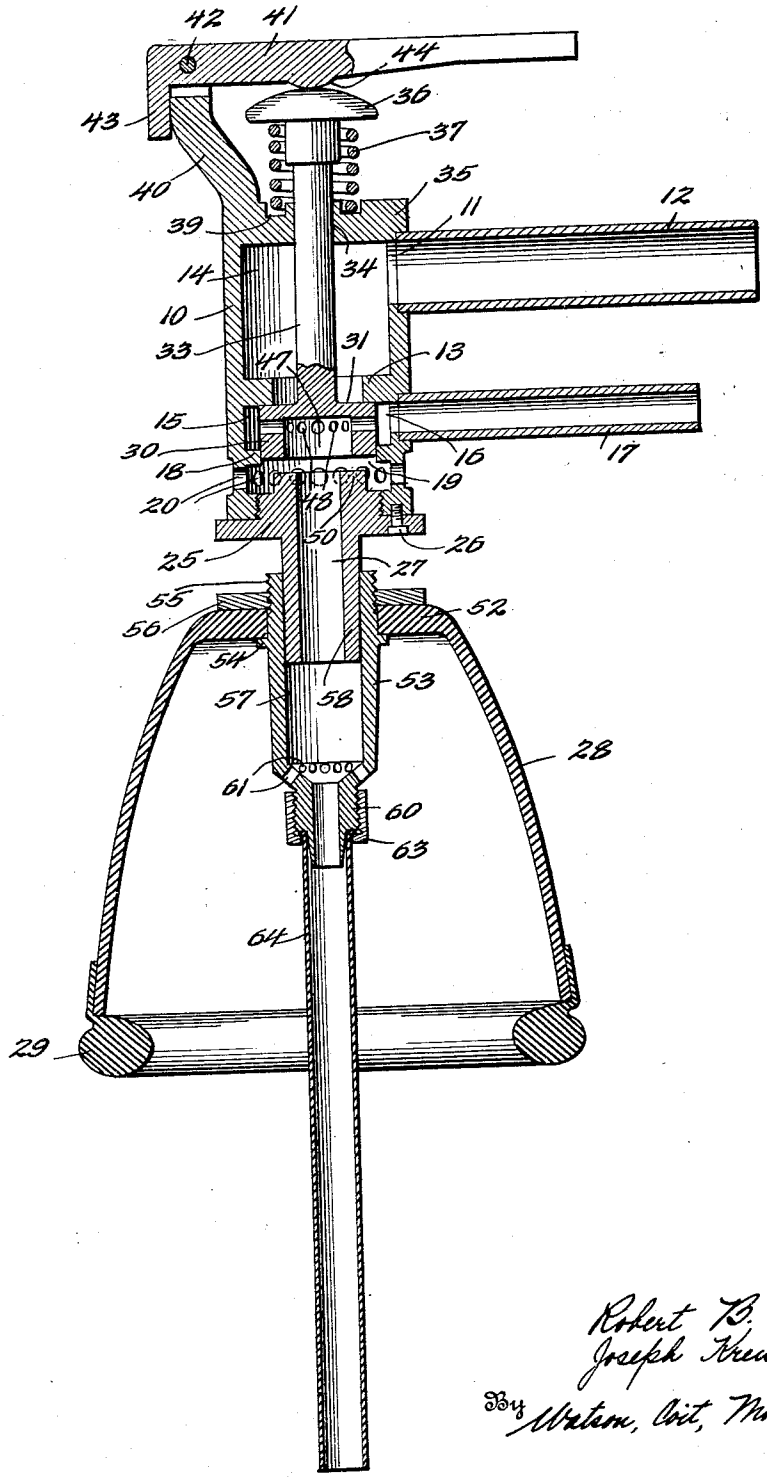
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RESUSCITATION APPARATUS

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Inventors

Robert B. Swope and
Joseph Kreiselman

By Watson, Cole, Morse & Grindle

Attorneys

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ROBERT B. SWOPE AND JOSEPH KREISELMAN, OF WASHINGTON, DISTRICT OF COLUMBIA

RESUSCITATION APPARATUS

Application filed August 10, 1928. Serial No. 298,746.

The present invention relates to resuscitation apparatus and particularly to devices for effecting the introduction of gas under pressure into the lungs of a patient.

It is a primary consideration in artificially inflating the lungs of a patient, particularly the lungs of newly born infants, to supply the oxygen or other gas under pressures which are sufficiently low that all danger of rupturing or otherwise injuring the walls of the lung is avoided. Further than this however it is necessary to provide means for effecting the actual introduction of the gas under this low pressure into the lungs since obviously this low pressure gas will not pass down the throat of the patient should the throat happen to be obstructed, as by the tongue. The present invention provides means whereby, intermittently and in proper volume, gas may be passed from a suitable source of supply into the lungs of a patient and whereby the expiration of this gas by the natural contraction of the walls of the lung cavities may be permitted, both the introduction of the gas into the lungs and the expiration thereof from the lungs being under the convenient control of an operator.

The present invention contemplates a novel arrangement of a gas inspiration and expiration control means and a device or appliance to be fitted to the head of the patient, the arrangement being such that the last mentioned appliance may be adjusted and maintained in adjustment by the operator, who is grasping the control device, so that this operator may have in one hand the complete mechanism for controlling the artificial inspiration and expiration of the patient and has his other hand free to manipulate pressure reducing devices or other appliances which may be associated with the resuscitation apparatus in its entirety.

Also in its details the present invention has a number of novel features which render it more sanitary and more convenient and effective in operation than others of this general type which have heretofore been designed or suggested.

In the accompanying drawing, the single figure is a vertical cross section through the device for introducing and controlling resuscitation gases according to the present invention, and showing the face mask, airway, manipulating valve, and connections therefrom.

The device embodies essentially a casing 10. This casing is provided with an inlet 11 communicating with a pipe 12 through which the resuscitation gas is supplied under a comparatively low pressure. The casing 10 is provided with an inwardly directed annular flange 13 above which is a gas chamber 14, and below which is another chamber 15. A tap 16 affords communication from the chamber 15 to a tube 17 adapted to be connected with a pressure indicating device, preferably a manometer, which forms no part of the present invention and is therefore not illustrated in the drawing.

A second internal flange 18 is located between the chamber 15 and an air chamber 19, which is provided with a series of air vents 20. As thus described it will be apparent that the casing 10 is substantially hollow and its interior cavity comprises the three chambers 14, 15 and 19, separated only by the internal flanges 13 and 18 respectively.

The lower end of the casing 10 is threaded to receive a nipple 25, which after being threaded into position is secured by a lock screw 26. The nipple 25 has a central bore 27 which communicates with the face mask indicated generally at 28.

Mounted in the chamber 15 is a control valve 30, which in the form shown is a substantially cylindrical, hollow member having a flat upper surface 31 which seats against the lower surface of the flange 13. The periphery of the member 30 slidably engages the flange 18. The valve 30 has a central stem 33 of smaller diameter than the passage through the flange 13, and which projects freely therethrough, and on through a central aperture 34 in the upper head 35 of the casing 10. The stem 33 terminates in a cap 36, and a spring 37 concentric with the stem 33 lies therebelow with its lower end received in an annular groove 39 formed in the head 35. The spring 37 normally holds the upper sur-

face 31 of the valve 30 seated against the lower surface of the annular flange 13.

A portion 40 of the casing 10 is extended upwardly and is bifurcated to pivotally receive a lever 41 mounted on a pivot pin 42. This lever has an overhanging right angle flange 43 which normally holds the parts in the position shown in the drawing. The lever 41 is provided with a cam portion 44 which engages the head 36 so as to operate the valve when the lever 41 is depressed.

The lower face of the valve 30 is centrally bored forming an internal chamber 47, the upper portion of which is radially drilled to provide a plurality of bleed apertures 48 in communication with the chamber 47. The nipple 25 is provided with an internal upwardly projecting boss 50 for the passage 27, and which forms a lower seat for the valve 30.

The face mask 28 comprises a concave or cup shaped member preferably of stiffly flexible material such as comparatively thick rubber, or it may be provided with more rigid material, having a contact cushion 29 of very yieldable material and adapted to make substantially gas tight contact with the face of the patient. If desired the member 29 may be hollow and inflatable in order to more completely seal the mask to the face.

As shown the mask is provided with a base portion 52, somewhat thicker than the remainder of the mask, and a coupling member 53 passes therethrough, with the base 52 engaging a flange 54 on the coupling. The outer portion of the coupling 53 is threaded as at 55 to receive a flat nut 56, by means of which the base 52 is compressed against the flange 54 to seal the parts against the leakage of gas. The mask and coupling are connected to the casing 10 by means of an internal bore 57 of the coupling 53, which engages an outwardly projecting sleeve 58 integral with the nipple 25. Any desired quickly detachable connection may be used, but preferably the device is constructed as shown so that a firm friction contact holds the elements together, and permits the mask assembly to be quickly and bodily removed so that it may be sterilized by boiling or immersion in a disinfectant or antiseptic solution.

The lower end of the coupling member 53 is reduced in diameter, forming a threaded end 60 and an annular series of bleed orifices 61 are provided thereabove to communicate with the interior of the mask. A centrally apertured cap 63 is threaded on the end 60 and serves to clamp thereagainst a short length of the rubber tubing 64, which in the present embodiment forms the airway for supporting the tissues of the oral cavity to permit the passage of gas to the lungs of the patient. It should be noted that the element 64 may be of widely differet forms, materials, and constructions within the broad idea of my invention, so long as it serves to support the tissues and thereby permit the passage of the gas.

In operation the airway 64 is introduced into the mouth of the patient and urged past the tongue and into the throat so as to permit passage of gas to the lungs. At the same time the mask 28 is adjusted to the face so that the cushion 29 makes substantially a gas tight contact therewith. As the mask and its airway are carried by the casing 10, manipulation of both may be guided by the hand of the operator grasping the casing 10 in position to operate the lever 41.

After the mask and airway have been placed in position, the lever 41 is depressed and the cam 44 engaging the head 36 will force the stem 33 downward and consequently move the valve 30 downwardly against the action of the spring 37. Downward movement of the valve 30 will move the face 31 below the flange 13 and permit gas in the chamber 14, from the gas supply pipe 12 to pass through the flange 13 into the chamber 15, which being tapped at 16 will communicate the supply pressure through the pipe 17 to the pressure indicating device.

At the same time, the lower face of the valve 30 will contact with the boss 50, causing the chamber 47 to be sealed with the passage 27. Thus the gas in the chamber 15 will pass through the bleed holes 48 into the chamber 47, and through the passage 27 to the coupling 53. From the coupling 53 the gas passes through the end 60 into the airway 64, a portion of the supply being directed through the apertures 61 into the interior of the face mask to permit either nasal or mouth breathing.

When the lever 41 is released the spring 37 will retract the valve so that the surface 31 seats against the flange 13. This movement will remove the lower surface of the valve from the boss 51 so that the gas being expelled from the lungs of the patient may pass into the air chamber 19 and be exhausted through the apertures 20, which are in communication with the atmosphere. At the same time the passage 47 is also in communication with the air chamber 19 so that the bleed passages 48 and the tap 16 will release the pressure on the indicating device connected to the pipe 17 to permit it to return to the zero position. It should be noted that this arrangement permits normal breathing through either nose or mouth to take place at any time when the lever 41 is released, as the communication with the atmosphere through the apertures 20 is thereby established.

While one embodiment of the invention has been shown and described in great detail for the purposes of adequate disclosure, the invention is not limited to any of the details shown or described, but includes such embodi-

ments of the broad idea as come within the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A device for use with a resuscitation apparatus, for applying gas therefrom to the lungs of a patient, comprising in combination, a casing adapted to be held in the hand of the operator and provided with a connection for a flexible tube from said apparatus, said casing having rigidly connected thereto a face mask having an air way adapted to extend beyond the patient's oral tissues, and a valve in said casing for controlling the passage of gas to the mask and air way having a handle carried by the casing, said handle being movable directly toward the face of the patient to open the gas supply whereby the hand of the operator may hold the mask tightly against the face of the patient when manipulating the valve to supply gas.

2. A face mask for use with resuscitation apparatus, comprising a concave element having a face fitting periphery adapted to make substantially gas tight contact with the face of a patient and to enclose the nose and mouth, an air way passing through said element and adapted to pass beyond the oral tissues of the patient and hold them apart to permit the passage of gas to the lungs of the patient, and means for introducing gas into said mask outside of said air way.

3. A face mask for use with resuscitation apparatus, comprising a concave element having a face fitting periphery adapted to make substantially gas tight contact with the face of a patient and surrounding the nose and mouth, an air way passing through said element and adapted to pass beyond the oral tissues of the patient and hold them apart to permit the passage of gas to the lungs of the patient, and a coupling member through which said air way passes for sealing it where it passes through said mask, said coupling member being provided with bleed orifices to permit gas to pass to the inside of said mask as well as to said air way.

4. A face mask for administering gas to a patient, comprising in combination, a concave face shield having its periphery adapted to make substantially air tight contact with the face of the patient and surrounding the nose and mouth, and a tubular member located within said periphery and extending therebeyond for depressing and supporting the tissues of the mouth and throat of the patient to permit passage of the gas to the lungs, and means to supply gas to both the shield and tubular member.

5. A face mask for use with resuscitation apparatus, comprising a concave element having a face fitting periphery adapted to make substantially gas tight contact with the face of the patient and to enclose the nose and mouth, an air way adapted to pass beyond the oral tissues of the patient to hold them apart, an extension for said air way passing through said element to permit the passage of gas from the lungs of the patient directly to the atmosphere, and means for introducing gas directly into said mask.

6. A face mask for use with resuscitation apparatus, comprising a concave element having a face fitting periphery adapted to make substantially gas tight contact with the face of a patient and to enclose the nose and mouth, an air way adapted to pass beyond the oral tissues of the patient to hold them apart, an extension for said air way passing through said element to permit the passage of gas from the lungs of the patient directly to the atmosphere, and means including said extension for introducing gas directly into said mask.

In testimony whereof we hereunto affix our signatures.

ROBERT B. SWOPE.
JOSEPH KREISELMAN.