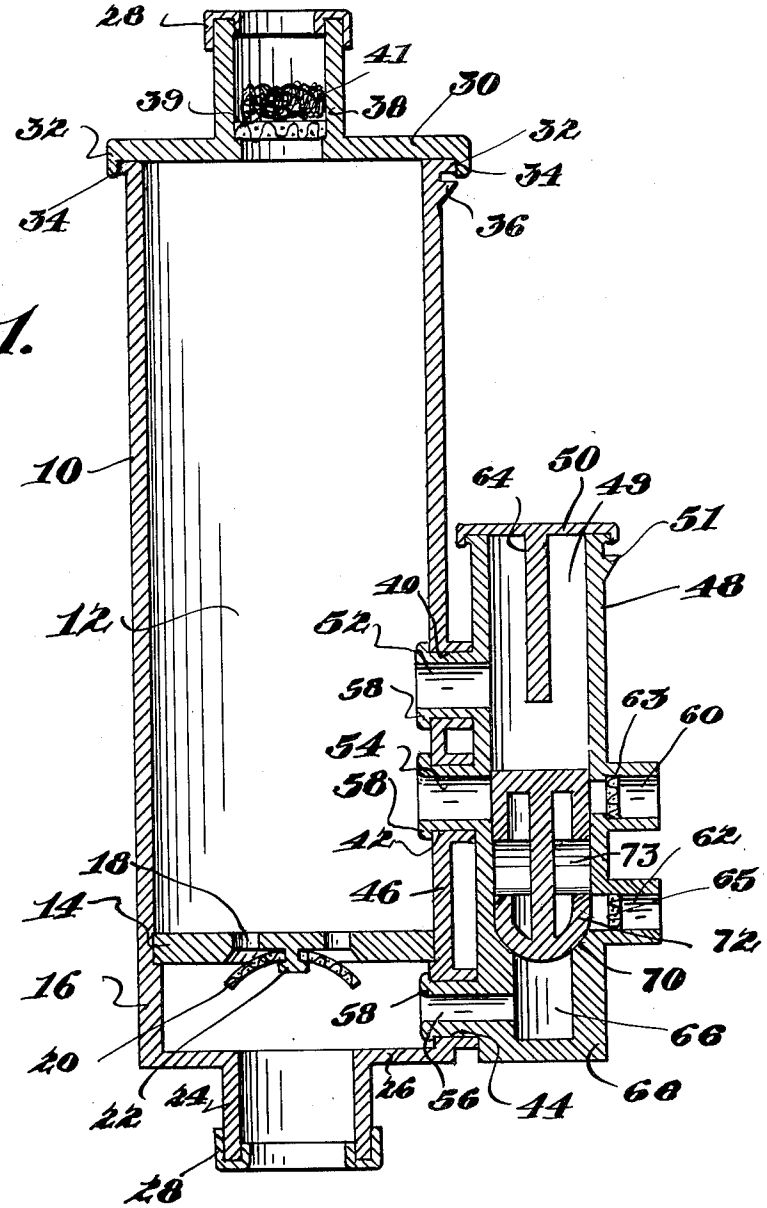
Jan. 30, 1962 P. C. WILSON ET AL 3,018,775

RESUSCITATOR APPARATUS

Filed Sept. 10, 1959 2 Sheets-Sheet 1

Fig. 1.



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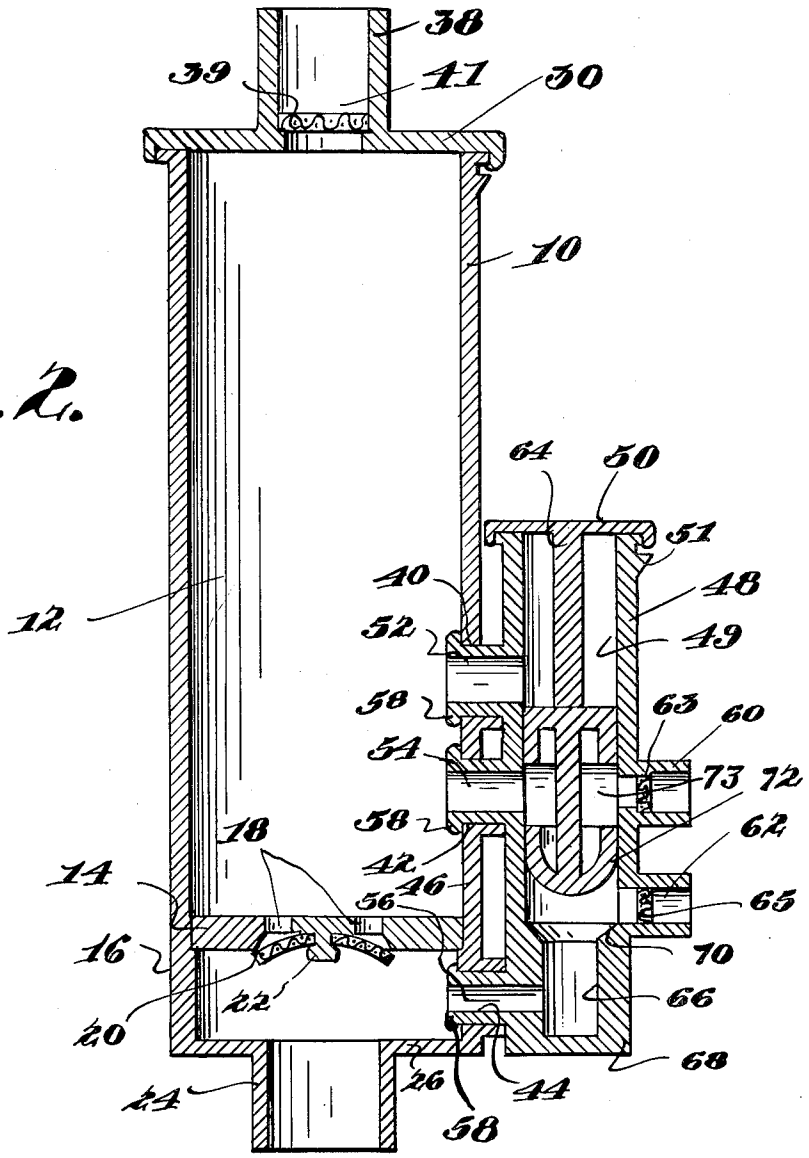
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Fig. 2.



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RESUSCITATOR APPARATUS

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This invention relates to resuscitators but more particularly to a mouth to mouth type. Although greatly simplified in design and operation, it is believed that a highly dependable and reliable apparatus and method for artificial respiration has been provided. The use of the subject invention accomplishes and insures tidal inflation of fresh unbreathed air to a non-breathing patient in a physiological manner, this being accomplished by the transfer of fresh air exchanged to the patient at the normal breathing rate and volume of the operator of the apparatus.

The operation of this apparatus has been so simplified that any person is able to speedily and competently provide the maximum of artificial respiration without prior training or experience. Furthermore, resuscitation may be accomplished with the victim in almost any circumstance or environment. The only requirement is that the mouth and nose be available for application of a conventional oro-nasal mask. Thus the vital time that is usually lost in removing the victim to a specified location is saved. Examples of such occasions where time is the main factor would be when a person suspended in water at the deep end of a pool, from the rear or side of a row boat or even possibly when at the top on an electric pole.

The device is designed to be molded entirely, except for the face mask, of flexible plastic to be snapped or screwed together. This means that all rubber or other material which might deteriorate is completely eliminated. This special feature of construction plus the relatively small overall size of the unit means that it may be stored in boats, automobile glove compartments, first aid kits or space around swimming pools, etc., without fear of it becoming inoperable due to disuse, adverse weather conditions, or even rough handling.

The snap together design feature further assures dependable operation by making it possible to clean every working part in a few seconds, the parts being readily separated without tools or by the application of a coin at appropriate locations. The apparatus may then be reassembled in less than a minute and ready for immediate use. However, the above would seldom be necessary in the event the apparatus was enclosed and stored in a plastic bag.

The resuscitator may be taken apart and reassembled as often as necessary without damage or harm to the mechanism. This makes it possible for an individual or group to become familar with its simple operating principles within minutes. Mechanical failure is highly unlikely as the operation of the device largely depends upon only one moving part, the slide valve. The activity of this valve is powered by atmospheric pressure and the valve itself is not attached to any part of the apparatus. The mode of movement is only contained and guided, thus wear due to friction or continual movement is practically non-existent. Contaminates which might interfere with the movement of the slide valve are practically discouraged from its vicinity by screen filters. The all plastic snap together construction further provides for economical mass production of the unit and its component parts.

It is an object of this invention to provide a simplified but effective apparatus to restore breathing by artificial respiration.

Another object is the provision of an unrestricted slide valve construction which, due to the particular design and

construction, the wear and tear on the moving parts is minimized and insures instant reliability of this specific type of emergency equipment.

A further objective is to provide a durable apparatus with the design of the component parts being such that each part is instantly accessible for emergency cleaning or replacement within the minimum of time.

An additional object is the provision of such a simplified construction that anyone can rapidly assemble or disassemble the apparatus and at the same time acquire a swift and competent understanding of the nomenclature of the device and its operation.

Still another object is the provision of a simplified apparatus that enables easy, safe and convenient storage as well as transportation.

A further and most important objective is the provision of an apparatus which enables the use of the operator's respiratory action for its motivation with complete assurance and safety.

A still additional objective is to provide an apparatus so designed that oxygen in high concentrations may be administered by the mouth to mouth method in a non-breathing victim and also in concentrations approaching 100% to a victim requiring it but also breathing on his own.

In the drawings:

FIGURE 1 is a vertical sectional view of the apparatus with the moving parts in the operator exhalation phase and the patient in the inhalation phase.

FIGURE 2 is a similar vertical sectional view with the moving parts shown in the operator inhalation and patient exhalation phases.

In the drawings where like numerals represent corresponding parts throughout the several views in the drawings, the numeral **10** refers to the main vertical cylinder having a primary air exchange chamber **12**. A downlet valve housing **14** is positioned on the lower wall **16** of increased thickness. Air passages **18** are formed in the valve housing **14** and a flexible nylon flap **20** is frictionally secured on the central portion **22**. A neck portion **24**, of reduced diameter, is provided on the lower central portion **26**. It is to be observed that caps or nipples **28**, for antiseptic and sanitary purposes, have been inserted over the necks **24** and **38** in FIGURE 1 and a conventional face mask is adapted to be frictionally mounted within the neck portion **24** for a purpose to be later explained.

Mounted on the top of the cylinder **10** is a snap cap **30** having a lower rim **32** adapted to frictionally engage the bead **34** and an offset shoulder **36** is provided whereby a coin or other edge may be inserted to facilitate the removal of this cap **30**. The neck portion **38**, of reduced diameter, is formed integrally with the cap **30** having a screen filter **39** located therein. Three ports **40**, **42** and **44** have been formed in the lower cylinder wall **46** for direct communication with a secondary cylinder **48**. It is also contemplated that a removable gauze filter **41** may also be inserted in the neck portion or mouth piece **38**, as shown in FIGURE 1.

This smaller secondary cylinder **48**, having a central or vacuum chamber **49**, is permanently attached to the wall **46** as will be noted. A snap cover **50** is secured to the top of the cylinder **48**, similar to the temporarily attached cover **30**, and a lip **51** extends outwardly permitting the insertion of a coin to facilitate the removal of this cover **50**.

Integrally molded with this secondary cylinder **48** are cylindrical extensions or conduits **52**, **54** and **56** having beads **58** to enable these extensions to be permanently snapped or frictionally secured in the respective ports **40**, **42** and **44** of the larger cylinder. Inlet and outlet ports

60 and 62 are formed from the lower opposite side of this secondary chamber 48 and are provided with filter screens 63 and 65. An elongation or valve stop 64 extends downwardly and centrally from the snap cap or cover 50. The lower portion 66, having increased wall thickness 68, is provided with a valve seat 70 for the sliding valve 72. The sliding valve 72 is provided with a central horizontal opening 73 which permits communication between the ports 42 and 60 when the valve is in its upper position.

In the operation of the device, when the operator inhales, pressure is reduced in the upper fresh air chamber; this is passed to the area immediately above the slide valve where it rises until it is stopped by the stop stem. Fresh air flows through the outer inlet and into the larger chamber; this inflow continues until the operator exhales.

When the operator exhales, the fresh air in the chamber is now compressed slightly, causing the valve to slide down over the air inlet ports. The fresh air is now forced through the downlet valve into the face mask and into the patient's lungs.

The lowering of the slide valve has meanwhile closed off the exhaust port and the increased pressure, due to the slightly larger top area above the slide valve and holds it closed until the pressure is decreased again by the operator's inhalation. When the operator inhales, he refills the exchange chamber with fresh air. The upward movement of the slide valve upon inspiration has now cleared the exhaust port and the patient exhales via this port. When the operator feels a need for fresh air he may inhale through his nose.

This apparatus is also designed to remove all esthetic or aversions to mouth to mouth, or, more probably, mouth to nose resuscitation. There is no rebreathing, with the use of the subject apparatus, by the operator of the victim's exhaled air. There is likewise no chance of contamination with the victim's vomitus or other contaminates of the operator or the resuscitator.

In further consideration of this apparatus, it is to be noticed that resuscitation is provided for the casualty in a physiological manner, providing for insufflation of the patient's lungs by the mouth to mouth method with fresh air or oxygen in physiological quantities. It is arranged so as to provide adult tidal volume of unbreathed air to the casualties and also allows the operator to rebreathe enough of his own exhaled air to prevent acarbia, thus precluding the usual symptoms of hyperventilation.

It is also to be noticed in the use of the subject apparatus that the operator's resistance, upon his inhalation, is low allowing unlimited continuation of effectiveness. This is due to the minimum amount of power necessary to activate the reduced sized slide valve.

Because of the mouth to mouth principle of operation, the dangers of excess pressure in insufflation of the patient's lungs is practically completely eliminated. Both the sensation of the limits of sufflation and the presence of any obstruction of the airway is very easily detected by the operator's respiratory system. This, of course, would not be true in the use of conventional mechanical devices and especially important when the patient is a small child or infant.

Further, the apparatus is most effective in the removal of adversion or aesthetic objections to mouth to mouth, or mouth to nose resuscitation. There is no rebreathing by the operator of the casualty's exhaled air and likewise, there is no chance of contamination from the patient's vomitus or other contaminates of the operator of the resuscitator.

The replacement of the filters and the sanitary caps assists for these principles and purposes can be appreciated in that the apparatus may readily be converted for use in contaminated atmosphere by merely placing a canister at the respiratory inlet.

We claim:

1. A mouth to mouth resuscitator apparatus comprising a large main cylinder and a smaller secondary cylinder, said large cylinder being formed with upper and lower chambers connected by a downwardly opening valve and with upper and lower tubular neck portions providing communication to the exterior and with a plurality of vertically spaced ports formed in the wall, two above and one below said valve, said smaller cylinder being formed with two external vertically spaced ports and also with tubular extensions snapped into the ports of said larger cylinder to connect said cylinders together and to provide communication between the two chambers of said larger cylinder and said smaller cylinder, a valve seat in the lower end of the smaller cylinder communicating with the lower tubular extension and lower port of said larger cylinder and an abutment in said smaller cylinder spaced above said valve seat, a sliding valve in said smaller cylinder movable between its lower position in engagement with said valve seat and its upper position in engagement with said abutment with its upper end formed to close the intermediate port of said larger cylinder to communication with the upper of said external ports and its lower end formed to close the opening in said valve seat and the lower port of said larger cylinder to communication with the lower of said external ports when said valve is in its lowermost position, said valve in its upper position uncovering said intermediate port and valve seat opening so that said intermediate and lower ports communicate with said upper and lower external ports, respectively, the upper of the ports in said larger cylinder opening in said smaller cylinder above said valve in its upper position, so that as an operator inhales at the upper tubular neck portion fresh air is brought into the apparatus and, upon exhalation, the valve is forced into its lower position to close said intermediate and lower ports of said larger cylinder to said external ports and the air is forced through the lower tubular extension into the lungs of the patient.

2. The structure of claim 1, in which said downwardly opening valve is a check valve which closes against upward flow of air.

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