Aug. 19, 1969 A. F. CHOUINARD ET AL 3,461,865

LOW COST RESUSCITATOR

Filed July 28, 1966

Fig. 2

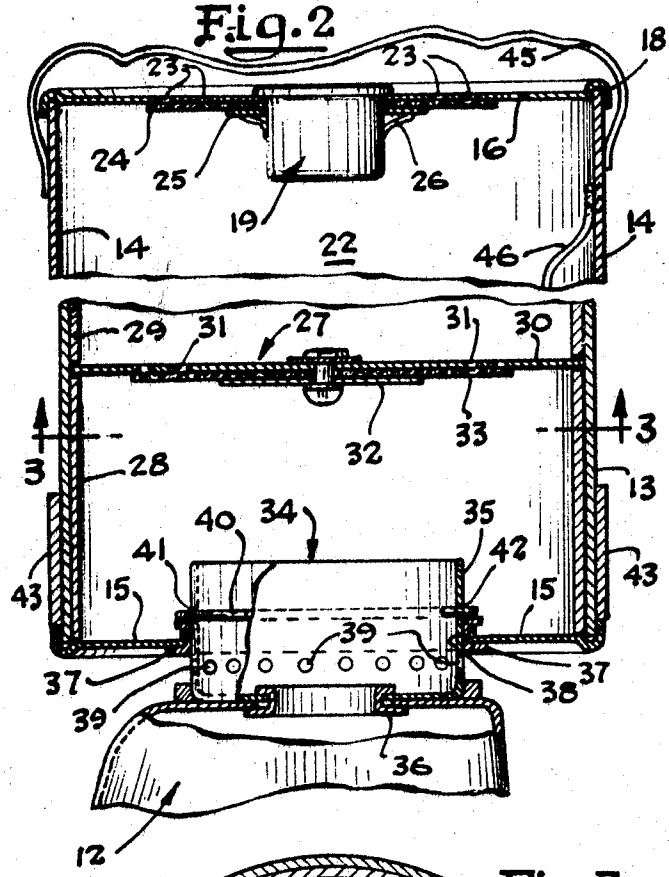


Fig. 3

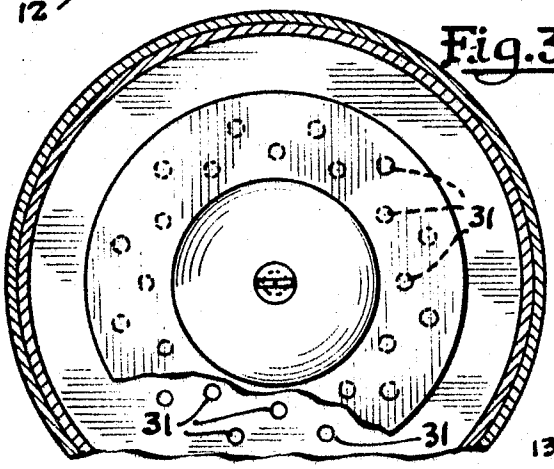
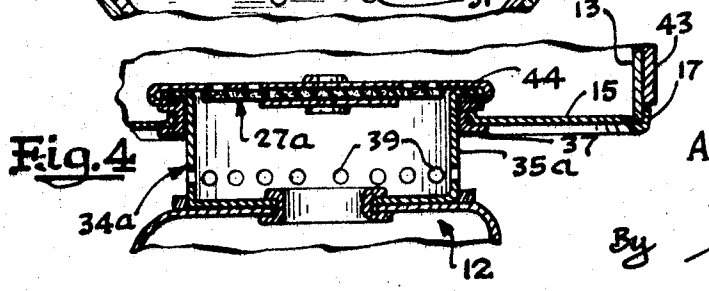


Fig. 4



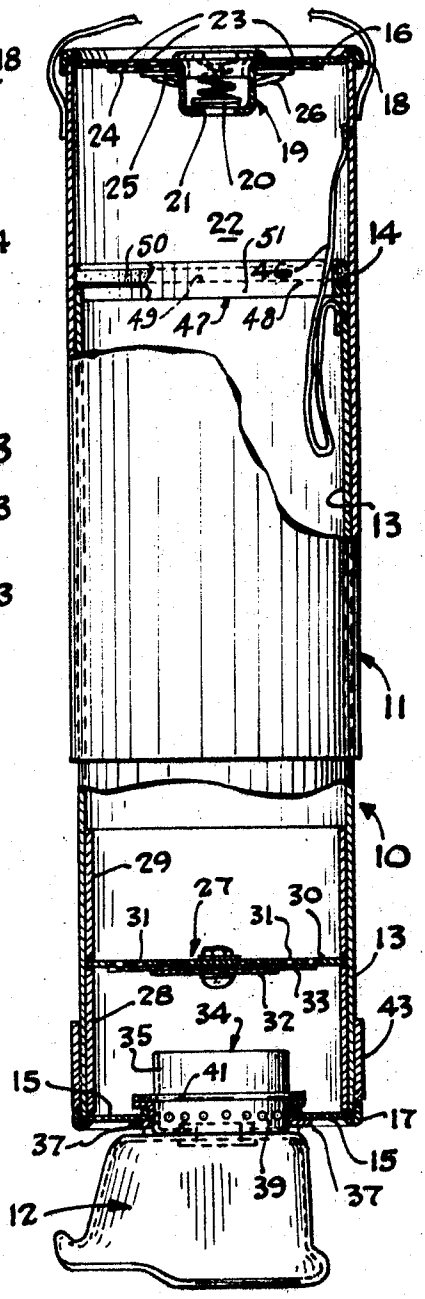


Fig. 1

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LOW COST RESUSCITATOR

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ABSTRACT OF THE DISCLOSURE

Apparatus having a face piece connected to telescoping tubular sections which force air under pressure into the face piece when the tubular sections are telescoped to a lesser extent. Valve means between the face piece and the telescoping sections expose exhaust ports to the atmosphere when the tubular sections are telescoped to a greater extent.

This invention relates to a low cost resuscitator useful in resuscitating a patient by forcing air into his lungs.

It is a primary purpose of the invention to provide a low cost resuscitator having a pair of tubes or tubular sections disposed in fluid-tight, sliding, telecoping relation with respect to each other, the ends of the tubular sections being closed off by end plates. The tubular sections can be constructed of low cost materials such as paperboard which may be impregnated with a suitable material such as a resin or wax, plastics, composites including laminated structures such as a layer of foil and a layer of paperboard or plastic, or thin metal. A face piece, connected to one of the end plates, is adapted to be placed against the face of the patient, preferably about his nose and mouth. When the tubular sections are moved relative to each other to be telescoped to a lesser extent, air under pressure is forced through a check valve, into the face piece and into the patient's lungs. A valve is preferably provided between the check valve and the face piece to vent gaseous fluid expelled by the patient to the atmosphere; this valve is preferably a slide valve, and opens when the tubular sections are moved relative to each other to be telescoped to a greater extent.

In the drawings:

FIGURE 1 is an elevational view, partly in section, of a low cost resusctator in accordance with the invention, showing a slide valve in one position;

FIGURE 2 is an enlarged, broken away, sectional view of the resuscitator shown in FIGURE 1, but showing the slide valve in another position;

FIGURE 3 is a sectional view taken along line 3—3 of FIGURE 2; and

FIGURE 4 is a fragmentary view showing an alternative construction or the resuscitator.

Referring now to the embodiment of FIGURES 1 through 3 of the drawings, there is shown a resuscitator generally indicated at **10**, having a body section **11** connected to a face piece **12**. The resuscitator **10** includes a pair of tubes or tubular sections **13** and **14** shown to be in sliding, fluid-tight, and telescoping relation with respect to each other. The tubular section **13** has an end plate **15**, while the tube **14** has an end plate **16**. The end plate **15** has a crimped flange **17** which embraces the end of the tubular section **13**, and the end plate **16** has a crimped flange **18** which embraces the end of the tube **14**. The end plate **16** has a pressure relief valve **19** having a spring loaded movable valve element **20** shown to be seated against a seat **21** in FIGURE 1. When the tubular section **14** is moved relative to the tubular section **13** to cause the air pressure in chamber **22** to exceed a preselected level the movable valve element **20** is unseated until the air pressure in the chamber **22** falls to the preselected level. The end plate **16** has a plurality of ports **23** by which air can enter the chamber **22** when the tubular sections **13** and **14** are extended relative to each other. This causes vacuum or subatmospheric pressure to exist in the chamber **22** and hence a flexible flap element **24** is caused to be held away from the ports **23**. A washer **25** and a clip **26** hold the inner marginal portion of the flap **24** against the end plate **16**.

A disc **30** of a check valve generally indicated at **27** is shown to be held in position in the tubular section **13** between the ends of short tubes **28** and **29**. The disc **30** has ports **31**. A washer **32** holds the inner marginal portion of a flexible flap valve element **33** against the disc **30**. Pressure in the chamber **22** will cause the valve elements **33** to move away from the ports **31**, thus enabling air under pressure to pass into the face piece **12**. A valve generally indicated at **34** and shown to take the form of a slide valve having a movable valve element **35** connected by a flanged connector **36** to the face piece **12** and a stationary valve element **37** connected to the end plate **15**. The end plate **15** has an opening **38** in which the valve element **37** is received. The valve element **37** takes the form of a ring of generally U-shaped cross-section. The valve element **35** has a plurality of ports **39**, which in the position shown in FIGURE 1 are closed off and which in the position shown in FIGURE 2 permit communication from the inside of the face piece **12** to the atmosphere. Movement of the valve element **35** with respect to the valve element **37** is limited by a retainer in the form of a wire **40** the ends of which project through opposed apertures **41** and **42** in the valve element **35**. A short tube **43** which encircles and is adhesively secured to the tube **13** serves to reinforce the end of the tubular section **13** and to provide a stop for a tube **14**.

In the embodiment of FIGURE 4 the tubes **28** and **29** are omitted and a check valve **27***a* connected directly to the valve **34***a*, replaces the check valve **27**. Valve element **35***a* has an outturned flange **44** to which the check valve **27***a* is secured. In all other respects the elements of the resuscitator shown in FIGURE 4 are the same as in the embodiment of FIGURES 1 through 3 and hence the same reference characters are employed.

In using the resuscitator **10** and assuming that the tubular sections **13** and **14** are in extended positions relative to each other and that the face piece **12** is suitably positioned against the face of a patient, upon moving the section **14** into a less extended position, that is, toward the face piece **12**, air pressure is built up within the chamber **22**, thereby forcing air under pressure through ports **31** of the check valve **27** and into the face piece **12**. Force exerted against the tube **14** by the user will insure that the valve **34** is in the position indicated in FIGURE 1. Movement of the tubular section **14** in one direction is limited upon abutment with the tube **43**. To permit the patient to expel gaseous fluid from his lungs the tube **14** is moved into extended position relative to the tubular section **13**, for example by pulling at strap handle **45** adhesively secured at opposed locations to the upper end of the tubular section **14**. As the user's hand holds the face piece **12** against the patient's face while the user is pulling on the strap handle **45** the valve **34** assumes the position shown in FIGURE 2 because the valve element **35** has shifted relative to the valve element **37**. As soon as the ports **39** are uncovered the patient can expell gaseous fluid through the face piece **12** and the ports **39** to the atmosphere. While the tubular section **14** is moved into extended position relative to the tubular section **13** air is admitted through the port **23** into the chamber **22**. To limit movement and prevent overextension of the tubular sections **13** and **14** there is provided a flexible connector **46** disposed in the chamber **22** and secured, as for example by stitching, at spaced apart locations to tubular

sections 13 and 14. In resuscitation of a patient, the tube is rhythmically and repeatedly reciprocated. A seal assembly generally indicated at 47 can be employed, if desired. The seal assembly 47 includes a continuous circular ring 48 having an external groove 49 which receives a continuous annular seal 50 composed for example of a suitable flexible resilient seal material. The outer periphery of the ring 48 is spaced from the tubular section 14 to provide clearance. The ring includes a depending skirt 51 which fits against the upper inner marginal surface of the tubular section 13. The skirt 51 is adhesively secured to the tubular section.

While the tube 14 is shown to be disposed about the tubular section, the tubular section 14 can as well as slidably movable in fluid-tight telescoping relation with the inside of the tubular section 13. If desired the end plate 16 and the pressure relief valve 19 which it carries can be suitably mounted at the other end of the tube 14 provided that the tube 14 is slidable inside the tube 13. One, and preferably both, the valve elements 35 and 37 are composed of flexible resilient material such as polyethylene, polypropylene, styrene or the like. Assuming that only one of the valve elements 35 and 37 is to be composed of flexible resilient material, it is preferred that the valve element 37 be constructed of such material.

We claim:

1. Apparatus for resuscitating a patient, comprising: a body section including a first tubular section having an end wall, and a second tubular section disposed in fluid-tight, slidable, and telescoping relation with respect to said first tubular section, said second tubular section having an end wall opposite said wall of said first tubular section, said body section providing a chamber, a valve connected to one of said end walls operable to admit air from the atmosphere into the chamber as the tubular sections are telescoped to a greater extent and to close the chamber from the atmosphere for providing air under pressure as the tubular sections are telescoped to a lesser extent, a face piece connected to one of said end walls, a check valve between said chamber and said face piece when said first and second sections are slid relative to each other to force air into the lungs of the patient, said body section having means for limiting the amount

of air pressure in said chamber to a preselected level, and valve means connected to the face piece and slidingly mounted through the one end wall for movement into the body section as the tubular sections are moved relative to each other to be telescoped to a lesser extent providing for passage of the air from the chamber into the face piece said valve means having at least one port movable from a covered position inside of the body section when the valve means is inside the body section to a position exposed to the atmosphere outside the body section when the tubular sections are telescoped to a greater extent providing for passage of gas expelled by the patient through said face piece and valve means and from the port to the atmosphere.

2. Apparatus as claimed in claim 1, wherein said tubular sections are composed of paperboard material.

3. Apparatus as claimed in claim 1, wherein said check valve is mounted in said body section spaced from said valve means.

4. Apparatus as claimed in claim 1, wherein said valve means includes a first valve element and a second valve element, one of said first and second valve elements including the port.

5. Apparatus as claimed in claim 4, wherein at least one of said first and second valve elements is composed of flexible resilient material.

6. Apparatus as claimed in claim 4, wherein said check valve is secured to one of said first and second valve elements.

7. Apparatus as claimed in claim 4, including seal means between said first and second tubular sections.

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