A. N. HABBERLEY.

RESUSCITATOR.

APPLICATION FILED AUG. 23, 1919.

1,368,254.

Patented Feb. 15, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

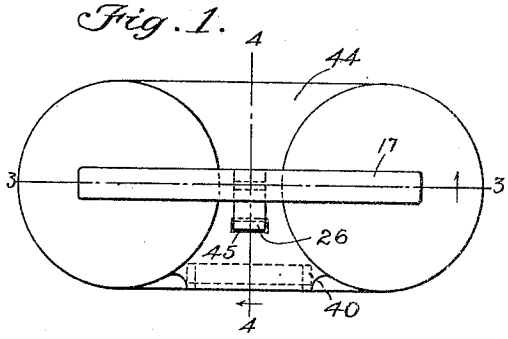


Fig. 2

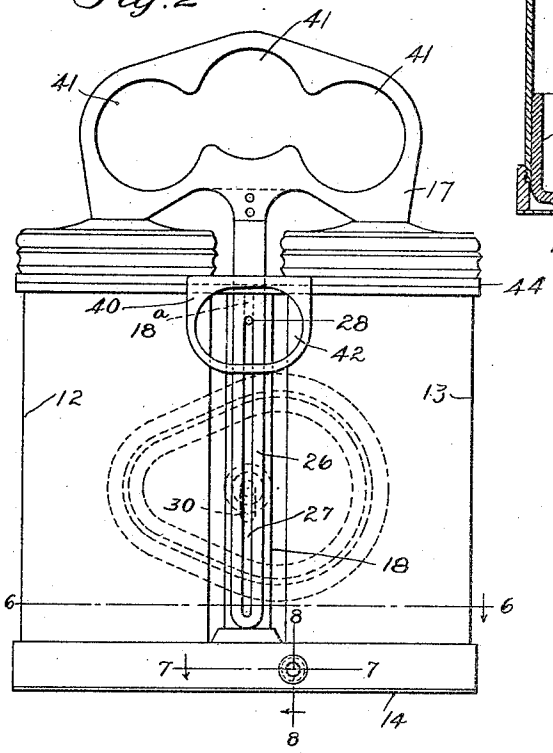


Fig. 3.

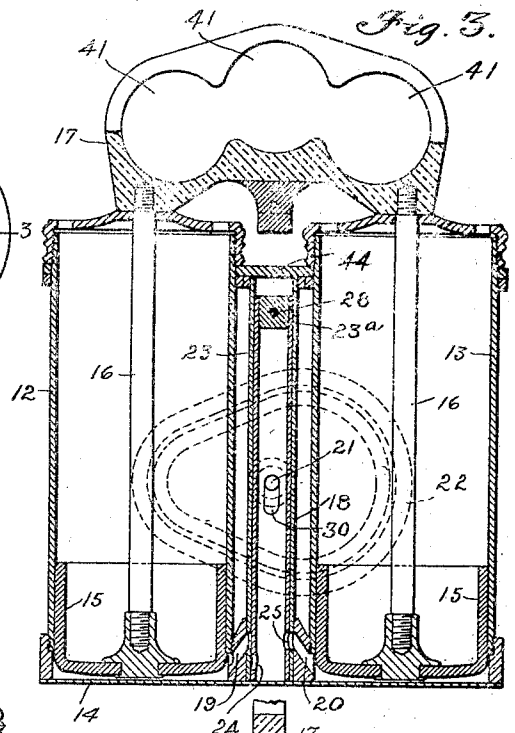
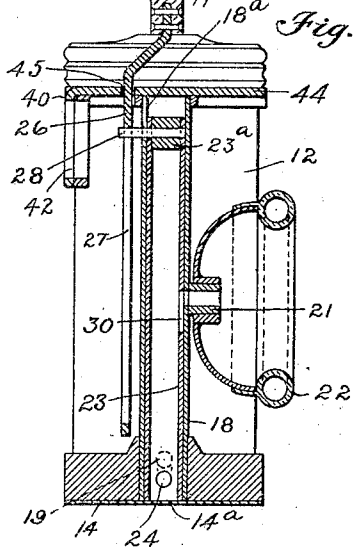


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 8.

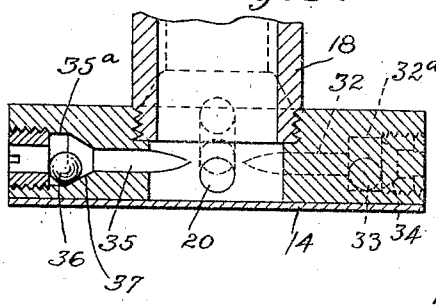


Fig. 9.

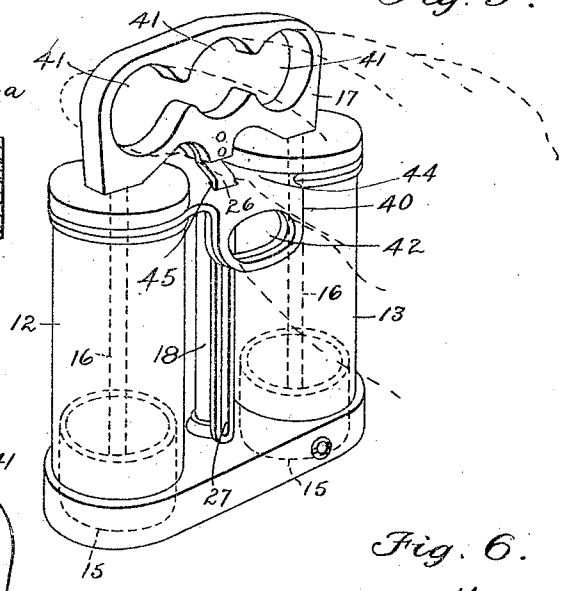


Fig. 5.

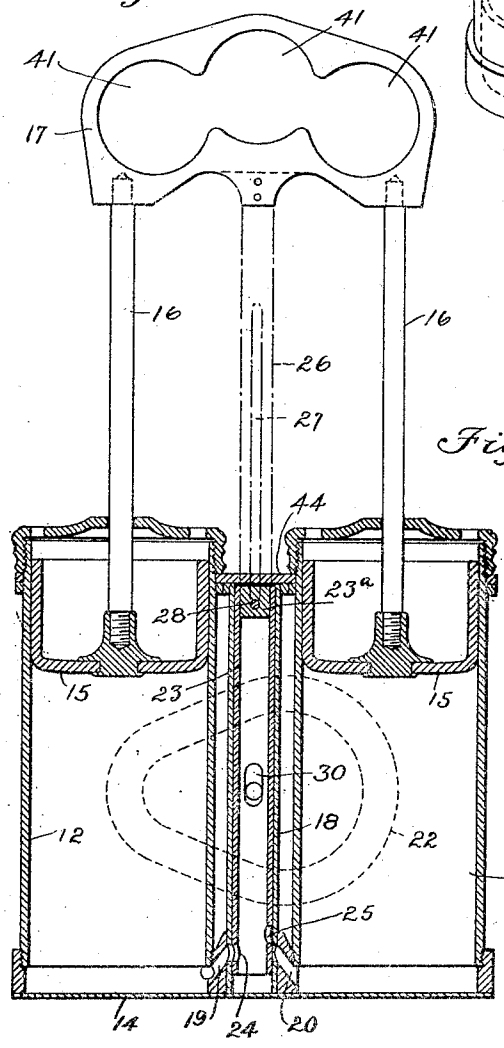


Fig. 6.

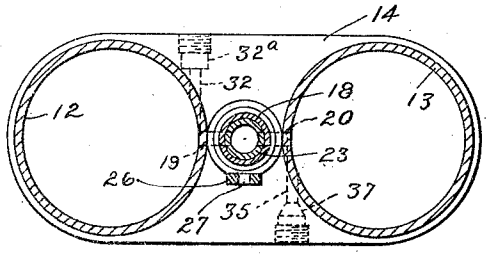
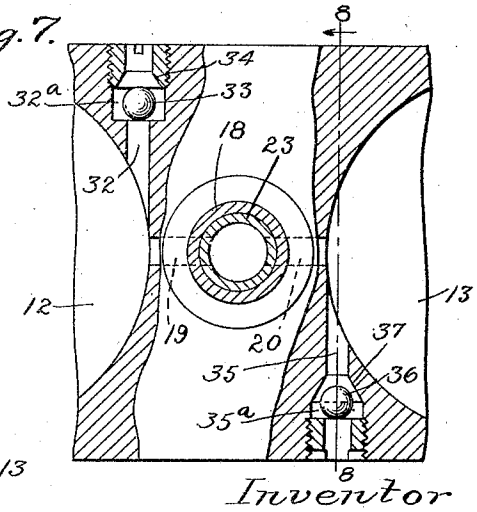


Fig. 7.



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UNITED STATES PATENT OFFICE.

ALBERT N. HABBERLEY, OF MELROSE, MASSACHUSETTS.

RESUSCITATOR.

1,368,254. Specification of Letters Patent. Patented Feb. 15, 1921.

Application filed August 23, 1919. Serial No. 319,484.

To all whom it may concern:

Be it known that I, ALBERT N. HABBERLEY, a citizen of the United States, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Resuscitators, of which the following is a specification.

This invention relates to an instrument known as a resuscitator, and used for artificially causing respiration, particularly in a newly born infant. The instrument, which is of the type shown by my Patent No. 896,824, dated August 25, 1908, comprises a pair of connected cylinders, connected pistons movable therein, and a mouth piece so communicating with the cylinders that reciprocating movements of the pistons alternately exhausts air from and forces it into the mouth piece, the latter being applied to the mouth and nose of the patient.

One object of the invention is to provide improved means for connecting the cylinders alternately with the mouth piece.

Another object is to enable the instrument to be controlled and operated wholly by one hand, leaving the other hand free to perform other necessary functions.

The invention is embodied in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification,—

Figure 1 is a top plan view of a resuscitator embodying the invention.

Fig. 2 is a side elevation of the same.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 3, showing the pistons raised.

Fig. 6 is a section on line 6—6 of Fig. 2.

Fig. 7 is a section on line 7—7 of Fig. 2.

Fig. 8 is a section on line 8—8 of Fig. 7.

Fig. 9 is a perspective view, illustrating the engagement of a hand with the cross head and ear hereinafter described.

The same reference characters indicate the same parts in all of the figures.

12 and 13 represent, respectively, the pressure and suction cylinders attached side by side to the base 14. The pistons 15 are connected by their rods 16 with a head 17 whereby the pistons are reciprocated in unison. Rigidly attached to the base between the cylinders is an outer tube 18, the lower end of which is connected with the lower end of the cylinder 12, by an air duct 19, and with the suction cylinder 13, by an air duct 20. The outer tube has a closed inner end, formed by a portion 14^a of the base. To the tube 18 is fixed a nipple 21, through which air passes to and from the tube. A mouth piece 22 is supported by and rigidly attached to the nipple and communicates with the bore thereof. 23 represents an inner tube, constituting an air conduit, fitted to slide in the outer tube 18, and provided at its lower end portion with valve means preferably embodied in ports 24 and 25, arranged to coöperate as described later with the ducts 19 and 20. One end of the inner tube is closed as by a head or plug 23^a, and its opposite end is preferably open. The inner tube is adapted to be shifted endwise by the head 17 through connections including a shifting member 26, formed as an elongated strip, attached to the head and having a longitudinal slot 27, and a stud 28, fixed to the upper end of the inner tube, and entering said slot, the stud being movable in a slot 18^a in the outer tube. The upper end of the slot 27 is arranged to strike and move the pin 28 and the inner tube, just before the head and the pistons moved thereby reach the lower extreme of their movement, the port 24 being thus moved out of register with the duct 19, and the port 25 into register with the duct 20, as shown by Fig. 3. Just before the head and pistons reach the upper extreme of their movement, the lower end of the slot 27 strikes the pin 28, and raises the pin and the inner tube to move the port 24 into register with the air duct 19, and the port 25 out of register with the duct 20, as shown by Fig. 5. When the pistons are fully depressed, the pressure cylinder 12 is shut off from the inner tube 23, and the suction cylinder 13 is in communication with the inner tube, as shown by Fig. 3. When the pistons are fully raised, the pressure cylinder is in communication with the inner tube and the suction cylinder is shut off therefrom, as shown by Fig. 5. The inner tube 23 is always in communication with the mouth piece through a slot 30, in said tube, arranged to register with the bore of the nipple 21, when the tube is at each extreme of its movement.

The base is provided with an air passage 32, communicating with the lower end of the pressure cylinder 12, and having an enlargement 32^a containing a ball valve 33, the

outer end of said enlargement having a tapered seat 34 for said valve. The base is provided also with an air passage 35, communicating with the lower end of the suction cylinder 13, and having an enlargement 35[a] containing a ball valve 36, the inner end of said enlargement having a tapered seat 37 for said valve.

The operation of the parts thus far described is as follows:

The pistons being at the lower ends of the cylinders, as shown by Fig. 3, upward movement of the pistons causes the piston in the suction cylinder to draw air through the mouth piece, which is now secured by straps, not shown, to the patient's head, in position to cover the mouth and nostrils, so that vitiated air is drawn from the lungs into the suction cylinder 13, through the mouth piece 22, nipple 21, inner tube 23, port 25, and duct 20, the valve 36 being held by suction against the seat 37, and preventing the admission of outside air to the suction cylinder through the passage 35. At the same time, the piston in the pressure cylinder 12 draws outside air into said cylinder through the passage 32, the valve 33 being separated from its seat 34, and resting loosely in the enlargement 32[a]. Just before the pistons reach the upper end of their movement, the inner tube 23 is shifted by the means described, so that during the downward movement of the pistons, pure air is forced from the pressure cylinder 12 into the mouth piece and lungs through the duct 19, port 24, inner tube 23, nipple 21, and mouth piece 22, and the air drawn from the lungs into the suction cylinder is ejected through the passage 35 to the atmosphere, the valve 36 being unseated and resting loosely in the enlargement 35[a].

To enable the operator to steady the resuscitator and reciprocate the pistons by using one hand only, leaving the other hand free for other important uses, I so form the head 17 that it is adapted to be engaged and reciprocated by one or more, and preferably three fingers of one hand. I also attach rigidly to the cylinders an ear 40, adapted to be engaged by the thumb of the same hand.

As here shown, the crosshead 17 is provided with an elongated opening having three portions 41, adapted to receive the first, second and third fingers, and the ear 40 is provided with an opening 42, adapted to receive the thumb. These openings are relatively arranged to permit the simultaneous insertion of the fingers and the thumb, as indicated by dotted lines in Fig. 9. This figure shows the pistons at the inner ends of the cylinders, the hand being partly closed. The opening of the hand by movemen of the fingers away from the thumb moves the pistons to the outer ends of the cylinders. The end portions of the elongated opening in the cross head are substantially in alinement with the piston rods 16, and the opening 42 in the ear is centrally located relatively to the cylinders, the pistons and the piston rods. This arrangement enables the operator to advantageously apply the force of two fingers and the thumb of one hand in reciprocating the pistons and in holding the resuscitator in any desired position with relation to an infant supported, for example, in a tub of warm water by the other hand.

The ear 40 is preferably a part of a plate 44, having openings in which the cylinders are inserted, the cylinders being soldered, brazed, or otherwise attached to the margins of said openings. The plate 44 is provided with a slot 45 which guides the shifting member 26. The outer end of the outer tube is brazed, or otherwise rigidly secured to the plate 44, so that said tube is firmly supported at both ends, its inner end being fixed to the base.

I claim:

1. A resuscitator comprising a base, a pressure cylinder and a suction cylinder attached to the base, pistons movable in said cylinders, impelling means adapted to move said pistons in unison, a fixed outer tube having a closed end, air ducts connecting said tube with the corresponding ends of the cylinders, a mouth piece communicating with the outer tube, an inner tube closed at its end opposite the closed end of the outer tube and movable in the outer tube, and in constant communication between its ends with the mouth piece, said inner tube constituting an air conduit provided with valve means at its end portion adjacent the air ducts in the outer tube and adapted to communicate with said air ducts alternately, and connections between the inner tube and said impelling means, whereby a limited reciprocating movement is imparted to the inner tube by the impelling means.

2. A resuscitator substantially as specified by claim 1, the base being provided with alternately operative valved air passages communicating with the corresponding ends of the cylinders.

3. A resuscitator comprising a base, a pressure cylinder and a suction cylinder attached to the base, pistons movable in said cylinders, a cross head connected with said pistons to move the same in unison, a fixed outer tube having a closed end, air ducts connecting said tube with the corresponding ends of the cylinders, a mouth piece communicating with the outer tube, an inner tube closed at its end opposite the closed end of the outer tube, movable in the outer tube, and in constant communication between its ends with the mouth piece, said inner tube constituting an air conduit provided with valve means at one end portion, adjacent

the air ducts in the outer tube and adapted to communicate with said air ducts alternately, and with a laterally projecting stud at the opposite end portion, and a shifting member attached to said cross head, and provided with a longitudinal slot, the ends of which are adapted to engage said stud and impart a limited reciprocating movement to the inner tube.

4. A resuscitator substantially as specified by claim 1, the said outer tube having a nipple to which the mouth piece is secured, and the inner tube having a slot in constant registration with the bore of said nipple.

5. A resuscitator substantially as specified by claim 1, provided with a plate fixed to the ends of the cylinders opposite the base, the outer tube being fixed at one end to the base, and at its opposite end to said plate.

6. A resuscitator substantially as specified by claim 3, provided between the cylinders with a fixed plate having a slot which guides the said shifting member, the outer tube being fixed at one end to the base, and at opposite end to said plate.

7. In a resuscitator, in combination, a pair of cylinders, one of which is a suction, and the other a pressure cylinder, pistons movable in unison therein and provided with rods, a mouth-piece connected with the cylinders, means whereby reciprocating movements of the pistons are caused to first, simultaneously draw air from an outside source into the pressure cylinder, and air from a source connected with the mouth-piece into the suction cylinder, and then simultaneously force air from the pressure cylinder through the mouth-piece, and air from the suction cylinder to the atmosphere, a finger-engaging cross head rigidly connected with the piston-rods, and a thumb-engaging ear rigidly connected with the cylinders, the form and arrangement of said cross head and ear being such that the resuscitator is adapted to be held in an operative position, and operated, wholly by one hand of the operator.

8. A resuscitator embodying the combination specified by claim 7, the said ear being provided with a thumb-receiving opening, centrally located relatively to the cylinders, pistons, and piston rods, and the said cross head being provided with an elongated fingers-receiving opening, the opposite end portions of which are substantially in alinement with the piston rods.

In testimony whereof I have affixed my signature.

ALBERT N. HABBERLEY.