J. H. DRÄGER.

ARTIFICIAL BREATHING APPARATUS.

APPLICATION FILED NOV. 5, 1912.

1,136,517.

Patented Apr. 20, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

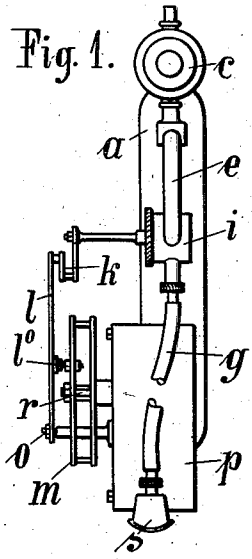


Fig. 2.

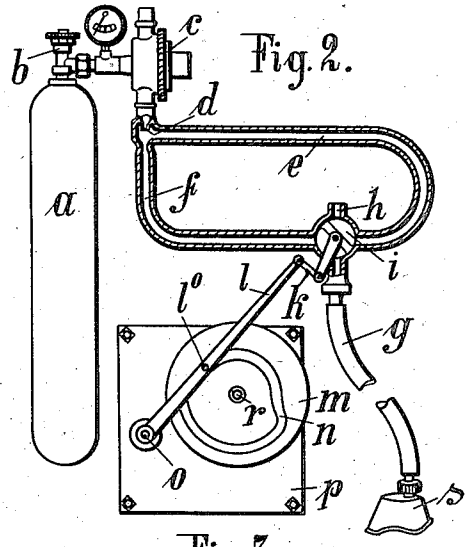


Fig. 3.

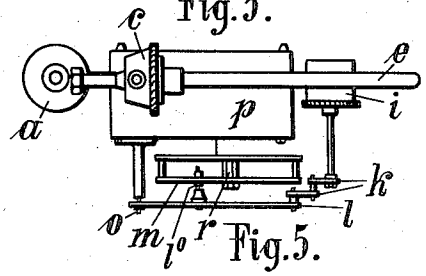


Fig. 4.

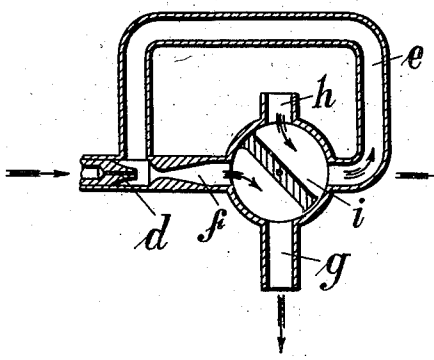
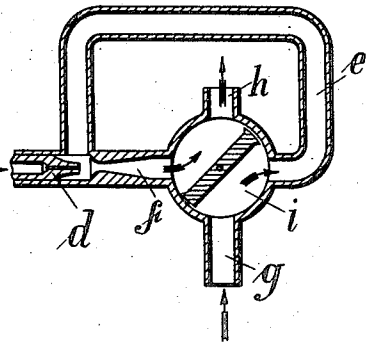


Fig. 5.



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3 SHEETS—SHEET 2.

Fig. 6.

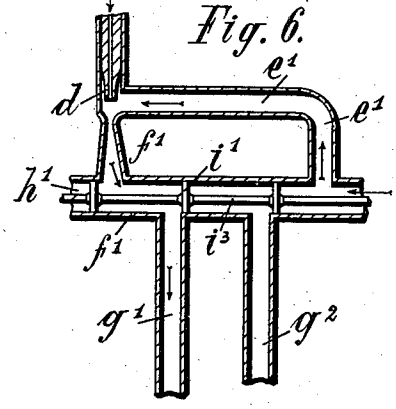


Fig. 7.

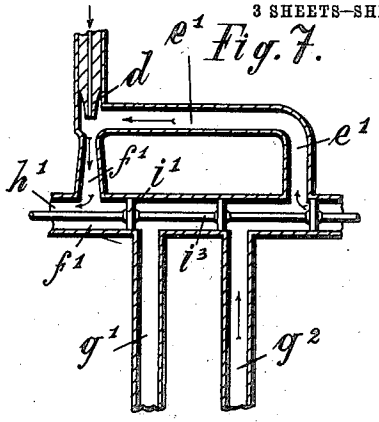


Fig. 8.

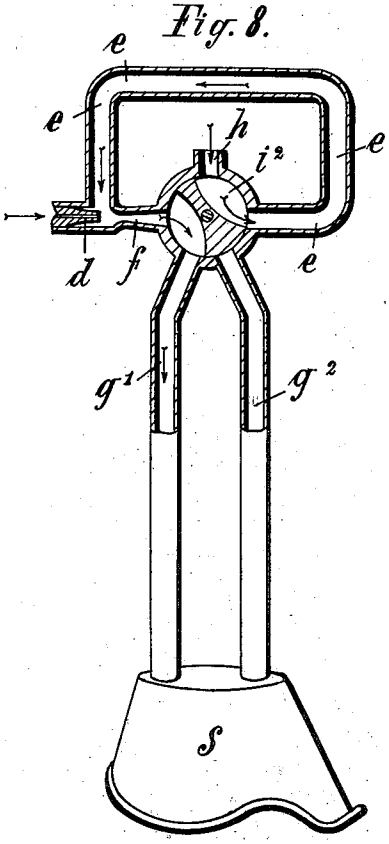
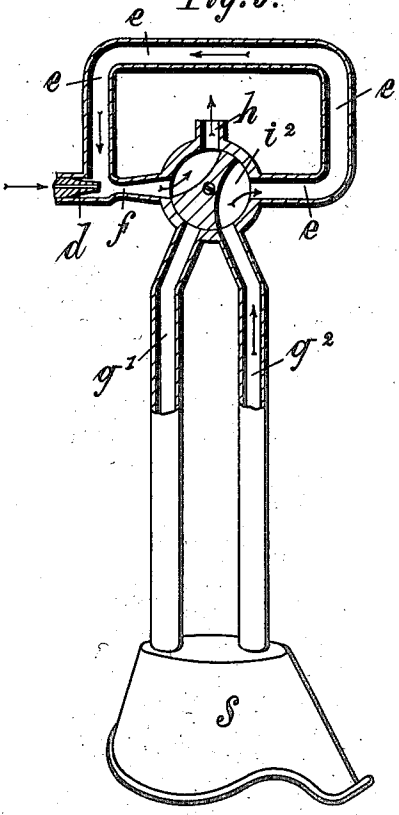


Fig. 9.



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1,136,517.

Patented Apr. 20, 1915.

3 SHEETS—SHEET 3.

Fig. 10.

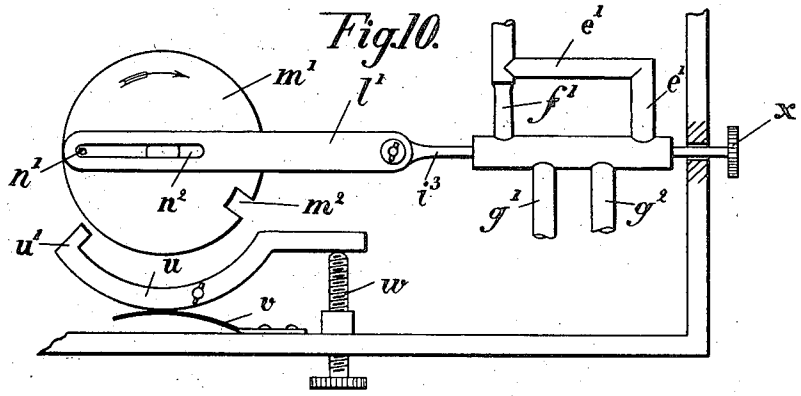


Fig. 11.

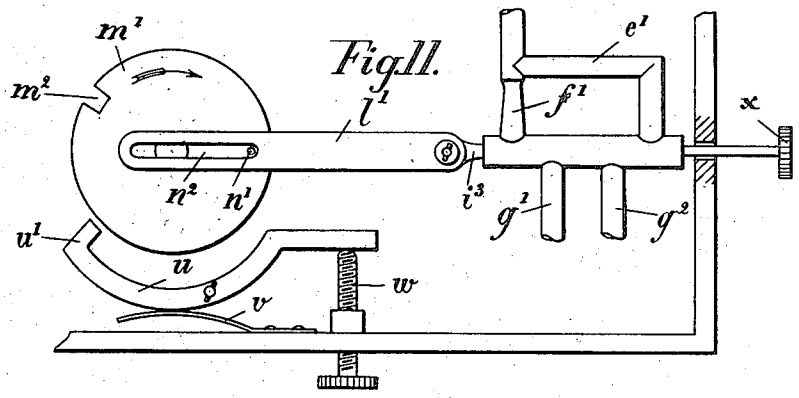
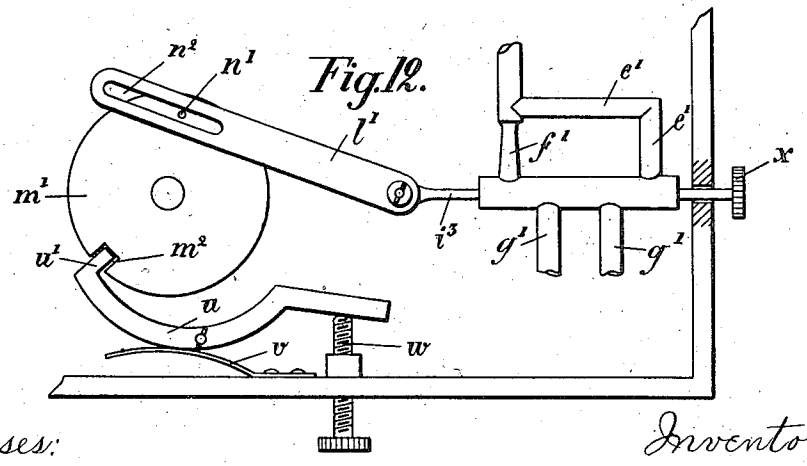


Fig. 12.



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UNITED STATES PATENT OFFICE.

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ARTIFICIAL-BREATHING APPARATUS.

1,136,517. Specification of Letters Patent. Patented Apr. 20, 1915.

Original application filed October 1, 1908, Serial No. 455,718. Divided and this application filed November 5, 1912. Serial No. 729,673.

To all whom it may concern:

Be it known that I, JOHANN HEINRICH DRÄGER, a subject of the Emperor of Germany, and resident of Lübeck, in the German Empire, have invented certain new and useful Improvements in Artificial-Breathing Apparatus, of which the following is a specification, and is a division of my application for which Letters Patent of the United States were granted January 7, 1913, under No. 1,049,346.

The present invention relates to improvements in methods and apparatus for artificially causing people to breathe. By the aid of a breathing apparatus air or some other suitable gas is forced into the breathing organs of the body and then drawn out again by suction in a way similar to natural breathing. Apparatus of this kind known heretofore differs from the present apparatus inasmuch as in the present apparatus the air or gas conducting means for the alternate connection with the breathing organs are so arranged that the same gas driving means is used both for producing the inhaling as well as the exhaling. The pipes used are connected with a pressure and suction device in a manner to secure a reliable operation.

In the drawings similar letters refer to similar parts.

Figure 1 is an elevation of an apparatus constructed according to this invention. Fig. 2 is a front view of the same partly in section. Fig. 3 is a plan. Figs. 4 and 5 are diagrammatical views of the air or gas conducting means. Figs. 6, 7, 8 and 9 are diagrammatical views of modifications of the last named means. Figs. 10 to 12 are elevations of an apparatus in three positions for operating the modification shown in Figs. 6 and 7.

In the apparatus shown in Figs. 1 to 5 *a* designates an oxygen (or other gas) flask having as usual an outlet valve *b* and reducing valve *c*, which by means of piping hereinafter described is connected with a mask *s*. The reducing valve *c* is provided with an ejector or nozzle *d* from which two pipes *f* and *e* lead to a valve for instance a four-way cock or valve *i* as shown. The latter is preferably connected with a breathing mask *s* by a flexible pipe *g* and is provided with a short pipe *h* leading out into the open air. The mask *s* may be dispensed with as the pipe *g* may be held in the mouth, or nose pieces may be provided. Thus the gas ejecting from the nozzle *d* under pressure passes by way of the pipe *f* to the cock *i*, at the same time creating a sucking action on the air contained in the pipe *e*. The pipes *f* and *e* are preferably so bent and connected that they constitute a rectangular circulation pipe. In order to cause an artificial inhaling and exhaling the cock must be alternately moved into such positions that the flexible pipe *g* of the mask *s* is connected either with the pipe *f* or with the pipe *e*. The result is that the breathing organs of the person to whom the mask is attached are alternately given oxygen (or gas) ejected from the opened valve *b* by the nozzle *d* together with air by the pipes *h*, *e*, *f*, *g* or the bad air is drawn from them by way of pipes *g*, *e*, *f* and *h*.

The change of position of the cock may be effected by any suitable means, for instance a motor may be provided to oscillate the cock. In the construction shown in Figs. 2 and 3 the motor comprises a clockwork *p* for rotating a shaft *r*, to which is fixed a cam disk *m*. A lever *l* is pivotally connected with a stud *o* and is provided with a pin *l*°, which projects into the cam slot *n* of the disk *m*. The lever *l* is connected with the handle of the cock *i* by a link *k*. By these means the clockwork *p* oscillates the lever *l*, which changes the position of the cock at regular intervals. Therefore the pipe *g* is alternately connected directly with the pipes *f* and *e* at regular intervals as clearly shown in Figs. 4 and 5.

As may be seen there is not a special ejector for the inhaling and a special ejector for the exhaling, but both operations are carried out by one single nozzle, which operates in connection with pipes *f* and *e*.

In the construction described above it will be preferable to make the flexible pipe leading to the mask as short or small as possible so as to allow very little air breathed out to enter the mouth again. However it is generally advantageous and frequently necessary to use pipes that are not too long or too small. In the modifications shown in Figs. 6 to 9 two flexible pipes are shown one g' for the inhaling and the other g^2 for the exhaling.

In the modification shown in Figs. 6 and 7 the pipes e' and f' are connected with an open ended cylinder h' having a piston rod i^3 carrying three pistons, which may be brought into two positions. In the position shown in Fig. 6 the left hand space between the pistons connects the pipes e' and f', so as to allow a mixture of air and oxygen to be forced into the pipe g' and in the position shown in Fig. 7 the right hand space between the pistons connects the pipes e' and f' in such a way that a sucking action takes place in the pipe g^2.

In the modification shown in Figs. 8 and 9 which is similar to that shown in Figs. 4 and 5, the cook i^2 is so formed that it shuts off either the pipe g' or the pipe g^2. The effect is the same as described with reference to the Figs. 6 and 7.

The pistons i' shown in Figs. 6 and 7 may be driven by a cam-disk m', shown in Figs. 10, 11 and 12. Said disk has a stud n', which projects into a slot n^2 of a link l', pivotally connected with the piston rod i^3. When the disk m' is rotated by means of a motor or clockwork, not shown, the pipes f' and e' are connected alternately with pipes g' and g^2, as above described. The disk m' may be provided with a notch m^2, which may be engaged by a projection u' on a pawl u, as shown in Fig. 12, which is acted upon by a spring v, and which may be withdrawn from this engagement at will by a hand operated screw w acting on the tail of the pawl. When the link l' is in the position shown in Fig. 12 the movement of the piston rod i^3 can be effected by hand, a knob x being provided for convenience.

I claim:

1. In an apparatus for generating artificial respiration, a pipe forming a complete circuit and having openings therein, means to supply air under pressure to said pipe in the direction of said openings, means adapted to direct said air out of the pipe through one of said openings and thereby create a suction through the other opening.

2. In an apparatus for generating artificial respiration, a pipe forming a complete circuit and having openings therein, means to supply air under pressure to said pipe in the direction of said openings, means adapted to direct said air out of the pipe through one of said openings and thereby create a suction through the other opening, and a branch pipe communicating with one of said openings and adapted to be connected with the mouth of a human being for the purpose specified.

3. In an apparatus for generating artificial respiration, a pipe forming a complete circuit and having branches therein, means to supply air under pressure to said pipe in the direction of said branches, and a valve arranged to simultaneously connect one portion of the pipe with one of said branches and the other portion of the pipe with the other branch, and thereby create a pressure of air in one branch and a suction in the other branch.

4. In an apparatus for generating artificial respiration, a pipe forming a complete circuit, a branch in the pipe opening into the air, a second branch adapted to be connected with the mouth of a human being, a nozzle in said pipe for supplying compressed air thereto in the direction of said branches, a valve in said pipe adapted to simultaneously open one branch and close the other to the air under pressure, whereby the escape of air from the pipe into one branch will create a suction in the other branch.

5. In an apparatus for generating artificial respiration means for supplying gas under pressure a circulation pipe in connection with said means, a nozzle in said pipe, centrally arranged within the pipe and adapted to cause a pressure in front and a sucking action in the pipe behind the front part of said nozzle, a valve in the pipe at a distance from the nozzle, a branch in the pipe opening into the air and controlled by the valve two more branches in the pipe so controlled by the valve that one of these two branches is connected with the pressure part of the pipe or the second of these two branches is connected with the suction part of the pipe, the other of the two branches being closed at that time.

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