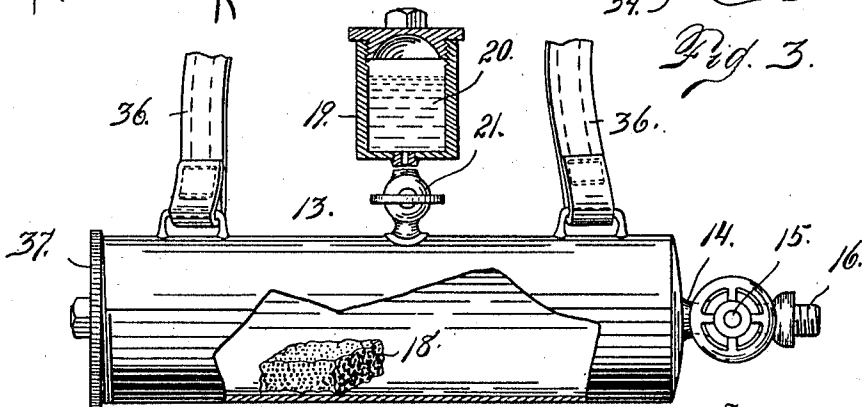
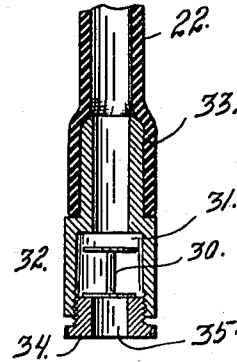
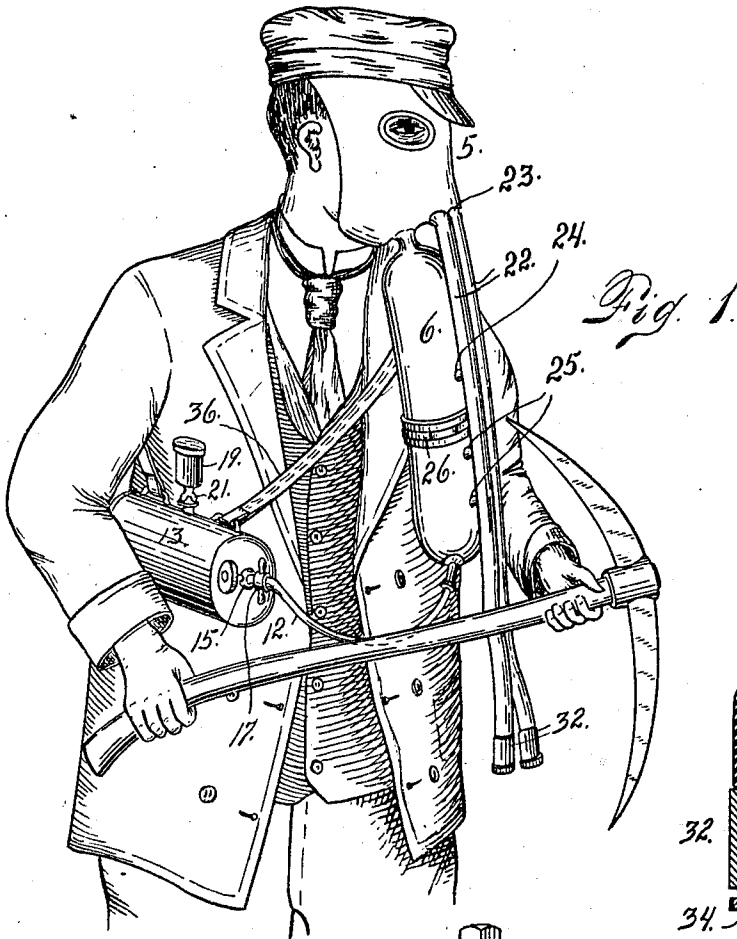


W. F. MERRYMAN.
 COMBINED RESPIRATOR AND PRESSURE EQUALIZER.
 APPLICATION FILED APR. 15, 1910.

1,003,935.

Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.



Witnesses

Otto E. Heddick.
 C. H. Roessner.

Fig. 2.

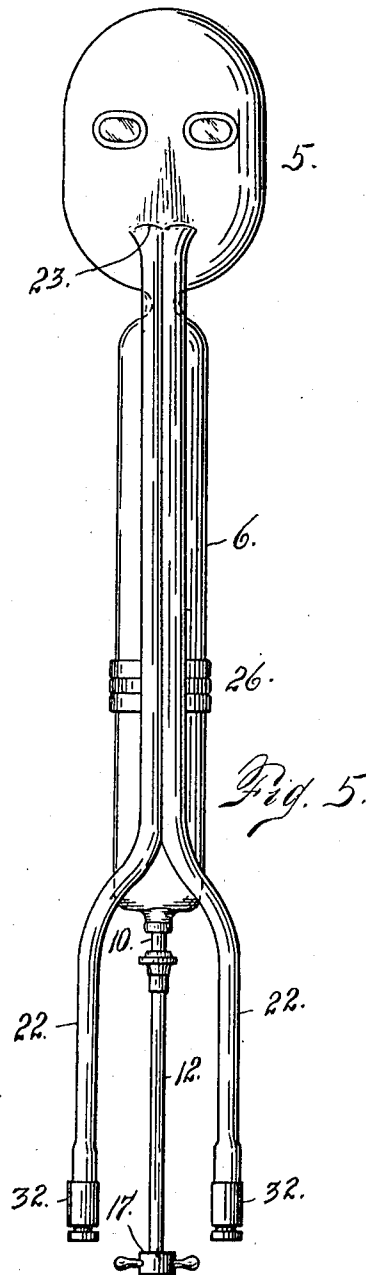
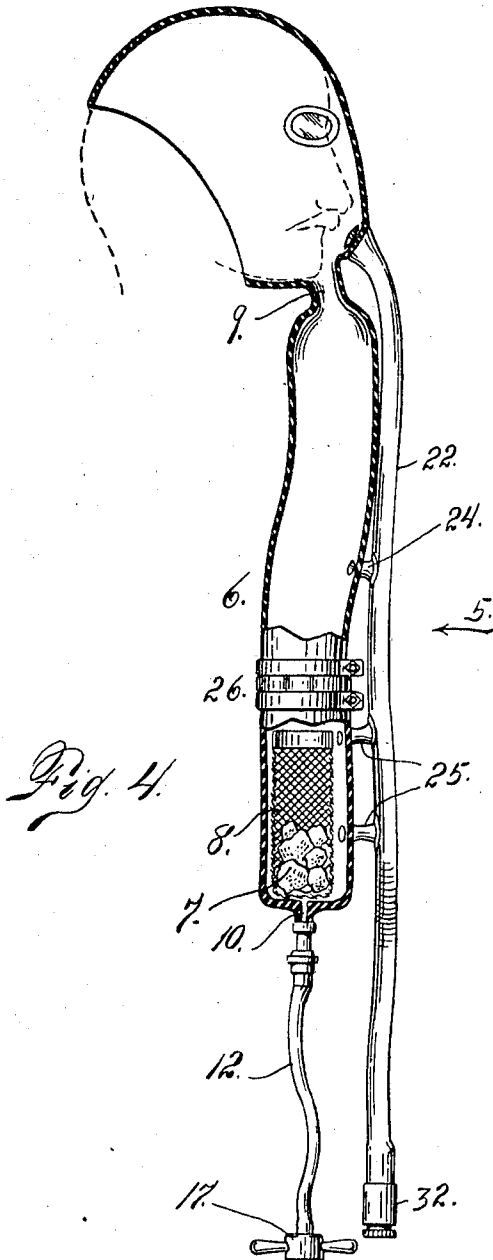
Inventor
 W. F. Merryman.
 By C. H. Brown.
 Attorney

W. F. MERRYMAN.
 COMBINED RESPIRATOR AND PRESSURE EQUALIZER.
 APPLICATION FILED APR. 15, 1910.

1,003,935.

Patented Sept. 19, 1911.

2 SHEETS—SHEET 2.



Witnesses
Otto E. Hoddick
C. H. Rossoner.

Inventor
W. F. Merryman
By J. O'Brien
 Attorney

UNITED STATES PATENT OFFICE.

WILLIAM F. MERRYMAN, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO PHILLIP HOFFMAN, OF DENVER, COLORADO.

COMBINED RESPIRATOR AND PRESSURE-EQUALIZER.

1,003,935.

Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed April 15, 1910. Serial No. 555,729.

To all whom it may concern:

Be it known that I, WILLIAM F. MERRYMAN, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Combined Respirators and Pressure-Equalizers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in apparatus adapted to make it practicable for a person to live when surrounded by an unbreathable atmosphere, or an atmosphere so vitiated or impure as to be nonrespirable without serious injury to the health or the destruction of life.

In my improved apparatus I employ a mask with which is connected a reservoir or bag containing a chemical, as oxone, adapted to generate oxygen when subjected to the action of the breath of the wearer, the moisture being sufficient for the purpose, that is to say for the generation of oxygen. With this mask is also connected tubes which intermediate their extremities are attached to and in communication with the oxygen generating reservoir or bag, the lower extremities of the tubes being either open or controlled by check valves, according to the surrounding conditions. Also connected with the oxygen producing bag or reservoir is a pressure equalizing tank which may contain compressed air or it may be supplied with a cake of oxone, a small water receptacle being mounted on the tank whereby a small quantity of water may be discharged into the tank at intervals for the purpose of quickly generating a breathable atmosphere of sufficient pressure to drive out light noxious gases which otherwise would enter the devices and suffocate the wearer of the mask.

The respirator, comprising the mask, the air tube and the oxygen generating bag, is protected by Letters Patent of the United States, No. 926,671, issued to me June 29th, 1909; while the air accumulator feature is

set forth in Letters Patent of the United States, No. 916,886, issued to me March 30th, 1909.

My present improvement, or rather the novel feature thereof, consists of a pressure equalizing tank connected with the oxygen-producing bag or reservoir, and adapted to supply pressure to the said reservoir or bag, under such circumstances, that otherwise the surrounding gas would enter. This pressure equalizing tank must be considered rather in the light of an emergency device for use with the other features of the apparatus whenever a surrounding gas is encountered of such a nature that it will enter the tubes of the mask and pass to the lungs of the wearer. On a recent occasion, I encountered a gas of this character and in the absence of the pressure-equalizing tank was obliged to retreat from the vicinity, and this tank has been connected with my apparatus for the purpose of providing for every emergency.

My improved equalizing reservoir, in combination with the respirator feature is designed to protect the wearer from irrespirable or dangerous gases; the equalizing reservoir containing compressed atmosphere or by generating its own oxygen by means of moisture applied to oxone or any material capable of producing oxygen by the application of moisture. This production of oxygen enables the wearer of the apparatus to increase at will the atmospheric pressure within the walls of the chambers of the respirator bag and protect himself from certain peculiar gases as aforesaid. By reason of this production of oxygen within the tank or by the utilization of the pressure within the latter, the wearer of the apparatus is allowed to instantaneously adjust his respiratory organs to the varying pressures of atmospheres or gases that are irrespirable or dangerous to human life.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a front view of an operator equipped with my improved apparatus without the air accumulator or hose nozzle attachment for collecting air.

Fig. 2 is a detail view of the pressure regulator or oxygen generating tank, shown on a larger scale. Fig. 3 is a sectional view on a larger scale taken through the nozzle extremity of one of the tubes, showing the check valve in place. Fig. 4 is a detail view of the respirator, having its main positions illustrated in section and equipped for use with the pressure-regulating tank or equalizing reservoir. Fig. 5 is a front elevation of the same or a view looking in the direction of the arrow 5, Fig. 4.

The same reference characters indicate the same parts in all the views.

15 Let the numeral 5 designate the face mask; 6 a chamber, in the lower portion of which is located a quantity of oxone 7 placed within a mesh receptacle 8. The upper portion of this chamber communicates with the face mask through an opening 9, while its lower portion has a duct 10 communicating with a flexible conduit 12 leading to the pressure tank or equalizing reservoir 13. As shown in the drawing, one extremity of this tank is equipped with a short pipe section 14 in which is located a controlling valve 15. This pipe 14 terminates in a threaded nipple 16 adapted to be connected by means of a screw coupling 17, with the flexible pipe 12. In this way the chamber 6 is adapted to be placed in communication with the pressure tank 13, by opening the valve 15, which, however, is normally closed. This pressure tank 13 may contain air or other respirable gas under pressure and small quantities may be let into the chamber 6 at suitable intervals by opening the valve 15 when for any reason it may be necessary to reinforce the pressure or the oxygen strength of the air within the said chamber.

As illustrated in the drawing, a cake 18 of oxone is placed within the tank 13, while a small receptacle 19, containing water 20, is mounted on the tank and adapted to be placed in communication therewith by opening a valve 21, whereby water may be discharged upon the oxone. This immediately results in the generation of oxygen and produces the required pressure and also forms an atmosphere strong in oxygen.

As shown in the drawing, the apparatus is equipped with two flexible tubes 22 whose upper extremities are in communication with the face mask 5, as shown at 23. Intermediate their extremities these tubes are in communication with the chamber 6, as shown at 24 and 25. The chamber 6 is composed of two separable members, connected by a coupling 26. The lower extremities of the tubes 22 are equipped with check valves 30 (see Fig. 3), the said valves being loosely mounted in a chamber 31 formed in a metal fixture 32 inserted in each end of a tube, as shown at 33. This check valve is

held in place by a screw plug 34 having an opening 35 in communication with the atmosphere.

The pressure-regulating tank or equalizing reservoir 13 is equipped with a supporting strap 36 adapted to pass over one shoulder of the operator (see Fig. 1). The head 37 of the tank 13 is detachably connected therewith to permit the introduction of oxone or other chemical for oxygen producing purposes.

If, for any reason, the oxone within the chamber 6 should not prove to generate oxygen with sufficient rapidity for the purpose; or if the nature of the noxious gases penetrating the surrounding atmosphere should be of such specific gravity, that they would pass up through the tubes of the apparatus, it then becomes necessary to open the valve 15, whereby air or oxygen under pressure from the tank 13 is allowed to enter the oxygen generating chamber 6 instantly and under sufficient pressure to prevent the entrance of or drive out, any gases which might enter the tubes under the circumstances aforesaid, at the same time supplying the operator with an atmosphere abundantly rich in oxygen. Under these circumstances, the respiratory organs of the operator readily adjust themselves to the increased pressure within the mask. The outer extremities of the tubes 22 are equipped with the check valves, (see Fig. 3). In this event, it will be understood that the check valves close by moving upwardly as the operator inhales, assuming that the nature of the gas is such as to produce this result. From my experience it appears that under some circumstances in coal mines there is an exceedingly peculiar gas, which in the absence of the check valves, will enter the tubes, and the object of the check valves is to adapt the apparatus for use, in connection with the pressure regulating tank or equalizing reservoir, for the aforesaid emergency. It must be understood that the check valve feature may also be employed without disadvantage, even when it is not absolutely necessary, since under ordinary circumstances, these valves need not be employed, but they are safer at all times, since the operator can never know with certainty when he will encounter the peculiar gas in question.

When the check valves are used and the tubes hang free (see Fig. 1), as the operator inhales the check valves close, thus shutting out any noxious gases that would have a tendency to enter, while during exhalation a certain portion of the impurities taken from the lungs, including carbonic acid gas, passes out through the valved extremities of the tube before the check valves can move outwardly to their seats. The rest of the impurities which must be expelled

will pass out around the head of the operator under the edge of the mask, but nothing will enter through this avenue during inhalation.

5 Having thus described my invention, what I claim is:

1. In apparatus of the class described, the combination with a respirator including a face mask, a bag in communication there-
10 with, and tubes connected with both mask and bag, of a pressure equalizing reservoir, a water containing receptacle, a valve-controlled connection between the receptacle and the pressure equalizing reservoir, and a
15 valve-controlled connection between said reservoir and the bag, for the purpose set forth.

2. In apparatus of the class described, the combination with a respirator comprising
20 a face mask, an oxygen generating chamber in communication with the face mask, breathing tubes also in communication with the face mask and connected intermediate their extremities with said chamber, a pres-
25 sure tank, a water containing receptacle in communication with the pressure tank, a valve controlling the flow of the water from the said water containing receptacle and the pressure tank, and a valve-controlled com-
30 munication between the pressure tank and the said chamber, for the purpose set forth.

3. In apparatus of the class described, the combination with a face mask, a flexible chamber in communication therewith, and
35 breathing tubes connected with the face mask at one extremity and with the said chamber intermediate their extremities, of a pressure tank, a water containing receptacle,

a valve controlled connection between the said receptacle and the pressure tank, and a
40 valve-controlled connection between said tank and the chamber, whereby it becomes practicable to increase the pressure in the chamber.

4. In apparatus of the class described, the
45 combination with a face mask, a flexible chamber connected therewith and adapted to contain a quantity of chemical for generating oxygen under the influence of the moisture of the breath, and breathing tubes
50 connected with the mask at one extremity and with the said chamber intermediate their extremities, of a pressure tank, a water containing receptacle and a valve controlled connection between the said recep-
55 tacle and the pressure tank, and a valve-controlled connection between said tank and the chamber, for the purpose set forth.

5. The combination with a face mask, and
60 a flexible chamber connected therewith, of breathing tubes in communication with the mask at one extremity, and with the flexible chamber intermediate their extremities, their outer extremities being equipped with
65 check valves, a pressure tank, a water containing receptacle and a valve controlled connection between the receptacle and the said tank and a valve-controlled connection
70 between said tank and the chamber, for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. MERRYMAN.

Witnesses:

ELIZABETH BOWEN,
A. EBERT O'BRIEN.