G. C. REEVES.

RESPIRATOR VALVE.

APPLICATION FILED JULY 15, 1918.

1,326,966. Patented Jan. 6, 1920.

FIG. 1

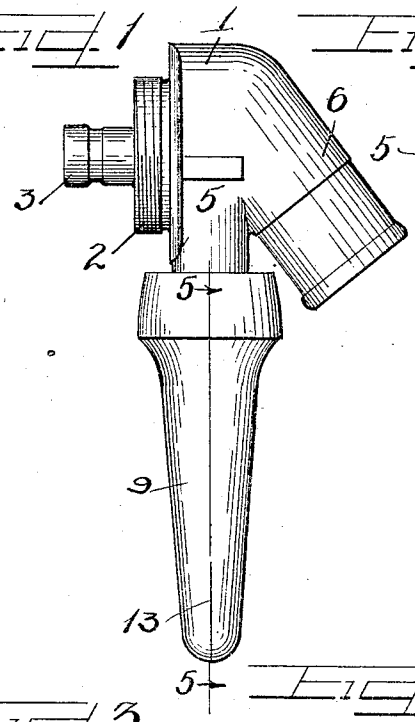


FIG. 2

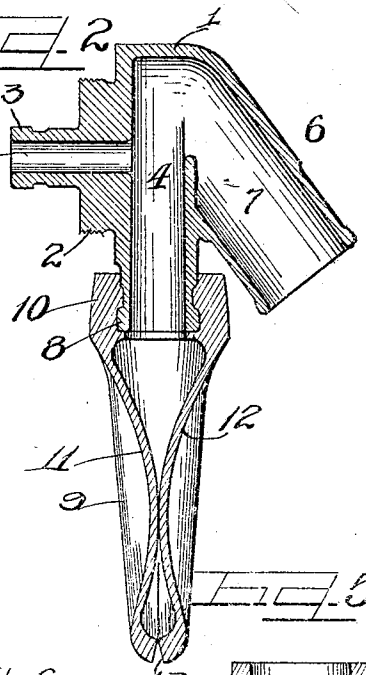


FIG. 5

FIG. 3

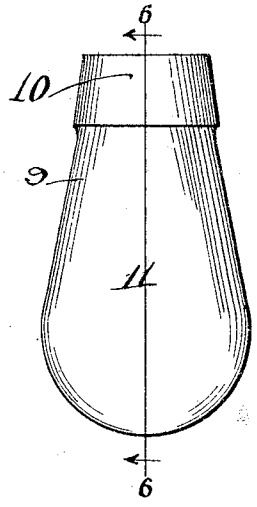
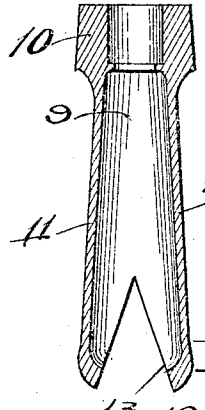


FIG. 6



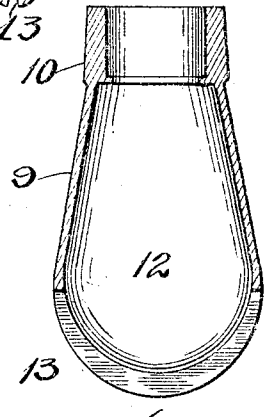
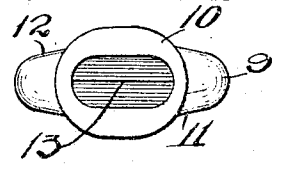


FIG. 4



Witnesses

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UNITED STATES PATENT OFFICE.

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RESPIRATOR-VALVE.

1,326,966. Specification of Letters Patent. Patented Jan. 6, 1920.

Application filed July 15, 1918. Serial No. 245,044.

To all whom it may concern:

Be it known that I, GEORGE C. REEVES, a citizen of the United States, and a resident of the village of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Respirator-Valves; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

My invention has reference more particularly to an exhalation attachment for a respirator and it is particularly adapted although not necessarily limited for use with gas masks which are now commonly used as a protection against poison gases.

In connection with respirators or gas masks, it is customary to provide means which will readily permit outflow of the air exhaled and which positively and effectively closes during inhaling to prevent admission of air therethrough, so that the air which is breathed in is taken entirely from the fresh air compartment or through the air purifying means as the case may be.

The valve which has been employed heretofore for this purpose consisted of a bag of soft pliable rubber, which, at one end was connected with the fitting through which the air is inhaled and exhaled, and the other end of which is provided with slits. The walls of the bag are arranged so as to lie directly one upon the other, and in exhaling, the walls separate sufficiently to permit the air to pass therethrough and out through the slits, and in inhaling, the natural arrangement of the walls together with the suction caused by the inhaling pulls the walls of the tube tight together and prevents entrance of air therethrough. This device has been found objectionable, however, not only because it is difficult to clean, but particularly because in cold weather, the moisture from the breath, which collects on the inner surfaces of the walls of the bag, freezes and on account of the extensive surface in contact, it is exceedingly difficult to reopen the passageway and maintain the opening therethrough, without constant freezing. Furthermore, presence of ice crystals or other foreign matter prevents positive closure.

It is an object, therefore, of my invention to provide a device of this character in which the danger of its operation being interrupted by freezing or presence of foreign matter is eliminated.

Another object of my invention is to provide a valve for a respirator in which the breathing manipulates the engaging portions of the valve in such a manner as to prevent the parts, forming the valve, from freezing together.

Another object of my invention is to provide a valve for a respirator having the surfaces serving as the valve limited to such an extent and so arranged as to reduce or eliminate the tendency to freeze together.

Another object of my invention is to provide a bag adapted to be used as a valve for a respirator, and having the walls thereof separated so that they may not freeze together, and to facilitate cleaning of the valve.

My invention also has other important objects which will appear from the following specification and the accompanying drawings, in which I have described and illustrated my invention in a preferred form.

On the drawings:

Figure 1 is a side view of the inlet and outlet fitting for a respirator or gas mask showing the exhalation valve applied thereto.

Fig. 2 is a view similar to that shown in Fig. 1, showing the parts thereof in section.

Fig. 3 is a side view of the valve bag.

Fig. 4 is a view looking at the upper or attaching end thereof.

Fig. 5 is a sectional view of the bag on the line 5—5 of Fig. 1.

Fig. 6 is a sectional view on the line 6—6 of Fig. 3, showing the valve opening of the bag abnormally separated as for the purpose for cleaning.

As shown on the drawings:

The reference numeral 1, illustrates a combined inlet and outlet fitting which has a threaded hub 2, at one side thereof, which is adapted to connect the fitting with the gas mask or face covering (not shown), and 3 is a nipple projecting inwardly therefrom which may be provided with a rubber sleeve if desired, and serves as a mouth piece to be held between the lips. There is a vertical passageway 4 in the fitting 1, the upper end of which is closed and has the opening 5 in the nipple 3 and hub 2 communicating therein at the side. At the front of the fitting 1, there is a large branch 6, having a passageway 7, communicating with the upper end of the opening 4, and this branch 6,

through which the air is supplied to be inhaled, may be connected with an air chamber or chemical compartment or other suitable device for furnishing air in the proper condition for breathing.

The lower end of the opening 4, which is open is surrounded by a nipple 8, which may be grooved circumferentially somewhat as shown to facilitate attachment of the valve bag 9, thereto, the neck 10, of which is expanded and slipped over the nipple 8, and contracted thereagainst to provide a tight joint. This bag is made of soft pliable rubber and is elliptical in cross section as shown, and the nipple 8, to which it is attached may also be elliptical in cross section as shown, so as to hold the bag 9, with a flat side next to the wearer.

This bag 9, which is the important feature of this invention, has the side walls 11 and 12 thereof tapered downwardly as shown in Fig. 1, and the edges thereof may taper outwardly from the connection at the top as shown in Fig. 3, so that the capacity of the bag is substantially the same from the top to the bottom, and the lower end of the bag is closed in a circular form as shown in Fig. 3, and slitted on a plane parallel with the side walls 11 and 12, as at 13.

The lips of the slit 13, are preferably thickened somewhat, as is clearly shown, to afford substantial engagement thereof and to insure complete and perfect sealing, and by reason of the walls 11 and 12 of the bag being spaced apart as shown, in inhaling the lips of the slit 13, are first drawn together, as shown in Fig. 1, which position, however, is the natural position assumed by the slit bottom portion of the bag, and as the wearer of the mask continues to inhale, the suction draws the walls 11 and 12, inwardly as shown in Fig. 2, thereby locking the lips of the slit bottom of the bag on the inner edges thereof, so that the connection thereof remains sealed, and at the same time affords movement to the lips so that said lips are not maintained in a fixed position a sufficient length of time to freeze together, but such freezing is avoided by the continually changing position of the lips. The walls 11 and 12, also are not in contact a sufficient length of time to freeze together as they come together only momentarily and substantially at the end of the act of inhalation. Furthermore, if under extreme conditions, the lips of the slit 13 should freeze together, they may be readily separated by manipulation with the fingers, as the surface of engagement is limited and may be readily broken apart. It is also to be noted that by reason of this construction, the slit bottom of the bag may readily be opened, as shown in Fig. 6, and as the walls of the bag are separated, access is readily had to the interior of the bag for cleaning purposes, and such access is not readily had in the devices at present employed for the same purpose as my invention.

The operation is as follows:

The fitting 1 is attached to the mask or face covering by means of the threaded hub 2, and the nipple 3, is inserted in the mouth of the wearer and used by him as a breather tube. The extension 6, is connected with the chemical compartment or otherwise to furnish the pure air. As the user exhales, the air finds a more ready passage down through the opening 4, than through the opening 7, as the bag 9, is constructed of soft rubber, and the lips of the slit 13, very readily separate to permit the escape of the air therefrom. As soon as the breath is expelled, the lips of the slit 13, naturally close together because of the construction of the bag and as inhalation takes place, the lips are caused to press together to prevent admission of air therethrough and insure the entire amount of air breathed in being taken in through the passageway 7. As the act of inhalation proceeds, a slight suction is created in the bag 9, and this causes the walls 11 and 12 to collapse more or less to the position shown in Fig. 2, which rocks the lips of the slit 13, on the inner edges thereof, maintaining a tight joint to prevent admission of air, the parts having a substantially line contact, and at the same time providing movement which will prevent the edges of the slit from being frozen together. As the wearer then exhales, the walls 11 and 12 first separate and then the slotted end of the bag opens as previously described to permit the escape of the air. Positive closing of the lips is not dependent on inhalation for the construction of the device, the wall thickness and mounting bring a slight normal closing tension on the device, insuring quick closing after each exhalation.

While I have shown and described my invention in a preferred form, I am aware that various changes and modifications may be made therein without departing from the principle of my invention, and I therefore do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. A respirator valve having the engaging parts of the valve adapted to simultaneously remain closed and move relatively.

2. A respirator valve comprising valve parts adapted to be separated by the pressure of the exhaled air and adapted to be simultaneously maintained in engagement and rocked one against the other by inhalation.

3. A valve for a respirator comprising a bag of flexible material having attaching means at one end and a valve slit at the other end, and walls at opposite sides of the

valve slit, normally separated and adapted to be gradually collapsed together by inhalation.

4. A valve for a respirator comprising a bag having spaced walls, attaching means at the upper end of the bag, and a slit at the bottom of the bag between said walls, said walls and slit being arranged to permit separation of the edges of the slit upon exhalation and to permit sealing engagement thereof upon inhalation and simultaneous rocking of the edges of the slit one against the other by approximation of said walls during inhalation.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

GEORGE C. REEVES.

Witnesses:
LAWRENCE REIBSTEIN,
EARL M. HARDINE.